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ABSTRACT

The papers collected here were presented at a three-day conference which focused on the use of communications technology for educational/instructional purposes. Participants included representatives from elementary and secondary schools; two- and four-year colleges and universities; continuing education and lifelong learning; industry, labor, and government; and the professions, including medical and health care, engineering, and law. The presentations reflect the three-fold purpose of the conference which was to (1) discuss issues and problems related to educational technology, (2) present case studies of successful applications, and (3) determine recommendations for future solutions to existing problems. Presentations include discussions of videodiscs, computer assisted instruction, the Educational Telecommunications for Alaska (ETA) project, microcomputers, and educational database systems. (ELS)

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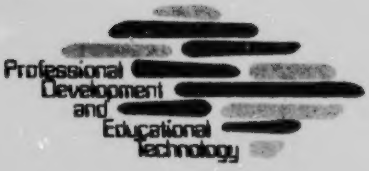
Professional
Development
and
Educational
Technology

Foreword, Part I

The concern for the emergence of an educational technology by AECT's constituents has at least a twenty-five year history. Even though the basis on which the professional association was built was a concern for the introduction of a variety of communication media, both sophisticated and unsophisticated into the educational process, it became apparent in the 1950's that this simple base led to some very complicated notions. When educators asked themselves why they should use other means of communications than the spoken and written word, a whole theory and body of research resulted. Hence, educational technology.

The relationship of AECT with the Federal Interagency Committee on Education (FICE) goes back more than a decade. Interestingly enough, it was after a briefing on educational technology by the undersigned that a Subcommittee on Educational Technology was formulated within FICE.

The conference which produced this book of proceedings was the brainchild of Bob Hilliard, Chairman of the FICE Subcommittee on Educational Technology, and other members of the FICE group. AECT is particularly pleased at the breadth of programmatic concerns and statements that are included in this program. The conference developed some extremely significant resolutions, questions, and statements in its small group discussions. Those are provided in the final chapter of these proceedings and deserve your careful reading.

Finally, it is my hope that the ideas, questions, demands, concerns expressed within these pages will serve to continue the forward momentum toward the development of a true educational technology—a long time dream of many within and without the educational community.

Howard Hitchens, Executive Director, AECT

Foreword, Part II

Most educational technology meetings, whether workshops, conventions or seminars, are oriented either toward the *application* of communications tools *or* toward the *understanding* of the principles of teaching and learning that are necessary for effective educational technology use. It is of special value when a conference gives us both. We return to our classroom, our studio, our office with increased knowledge of how to help improve the quality of education in our school, agency or plant *and* with a renewed vigor and dedication to do so.

However, a knowledge of educational technology and even the ability to successfully utilize it are not enough. We need an educational environment that permits and encourages the use of the cost effective resources, including technology, for the highest quality of teaching and learning.

At this conference on Professional Development and Educational Technology we wanted *all* the participants not only to return home with increased knowledge and stimulation, but with the satisfaction that *they* had developed concrete recommendations for further action that could result in the changes necessary for effective utilization of communications technology in our educational system.

The cooperation and hard work of Howard Hitchens and Dick Nibeck and the staff of the AECT, of Bernie Michael and Bob Teitler of Information Dynamics and of my FICE/SET colleagues who served on the planning committee not only made this possible, but made the entire conference development and implementation experience a personally gratifying and pleasurable one for me.

The conference program shows how process became as important as content. Working discussion groups of all conference participants interweaved with background material presentations. The first day began with an identifying of issues and problems through speeches and demonstrations, followed by a refinement and prioritizing of these issues and problems by participants meeting in working groups. That day ended and the next day began with the presentation of case studies of successful applications, followed by discussions of possible solutions to the problems. Once again the participants met in working groups to address the needs and solutions. The final day of the conference was devoted to the anticipation of future needs and the presentation of the recommendations for action decided upon by the conference participants themselves.

In effect, each participant became a leader, a decision-maker. No one, unless he or she deliberately wanted to, could go away with only those "take-home" pieces of paper that let us know we had passively been somewhere but left us unsure what it was we had actively done.

The result: the Recommendations of the conference, in the final chapter give us not only an evaluation of the past, but a mandate for the future.

But we cannot be content with just the recommendations. As with those from the FICE "Teacher Training and Educational Technology" conference of 1978—which prompted this conference and served as the bases for these new recommendations—this is just a first step. With the cooperation of national organizations such as AECT, of federal agencies such as FICE and, most importantly, your individual continued active leadership, prodding and participation in moving ahead with these recommendations we may yet motivate that part of the educational establishment still unsure about the values and uses of communications and technology to move boldly into the 20th and toward the 21st century.

Robert L. Hilliard, Chair, Subcommittee
on Educational Technology, Federal
Interagency Committee on Education

Preface

Peter D. Relic, Acting Assistant Secretary for Education, HEW, Washington, D.C.

My frame of reference in emphasizing a few points to you is that I'm a teacher. My entire frame of reference in my 22 year professional career is as an administrator and teacher in American public and private schools. I do not think that my remarks will mean all things to all people. I do not intend them to be so. I just hope that a few of the things will strike a respondent cord with a few of you.

I think you should take my remarks on educational technology advisedly. I have an unblemished record in electronic football and soccer—I have yet to beat my sons. I still have not won at skittles. All my slides are always upside down or backwards and even though I have been a teacher for almost a quarter century, I still cannot write on a blackboard. Being lefthanded, and always subjected to a righthanded desk, I never could position my hand properly to write those lines and circles.

By now, the modern technology available to us in the American public schools should have created a revolution in education. Television, the computer, the mini-computer and the calculator, information data retrieval systems, all should have created a revolution in American education. They have not yet. We have to find out why. Much of the power, much of the ability, much of the leadership exist in this conference. In the LEA's, the SEA's, the schools of education, the R&D centers, and the regional labs, we know we have the capacity in American education to use the technology available to us to create the change that conceptually we have been talking about for this past quarter century. I repeat—we have not. And while my remarks may seem somewhat harsh to some of you who are in the forefront, what I am essentially saying is that most of us are not on the bandwagon using the technology available to us. I want to make just six points to you.

1. In American elementary education, in spite of the hundreds and thousands of classrooms that are truly individualized and responsive to the needs of the children, there are contrasting those hundreds and thousands still thousands and tens of thousands and hundreds of thousands of classrooms which are six rows of six children each, everybody doing the same thing the same way at the same time. That is still the typical American elementary classroom. It's not right, it shouldn't be

that way and much of the power and ability to change that exists within this conference attendance.

2. We're in trouble in the high school. Anyone who doesn't admit that we are in trouble in the high school has missed the past 15 years of American secondary education. The secondary level content area teacher is not equipped today to deal with the problems he or she faces in the classroom.

3. The typical American building administrator is not ready to lead that building. In the elementary school today, the principal has to know a great deal about purchasing and record keeping, about program budgeting, about state reporting and federally funded programs, about data banks for innovative programs, about programmed instruction. That elementary principal has to know all about Title I, about management and labor and bargaining, and he or she doesn't. Those of you from the schools of education may say I am wrong, that you are doing it, but I think you are in the minority. The American elementary school principal learns how to be a principal on the job—not preservice, and not formal inservice, but by daily living the rigors and demands and problems and impossibilities of the job. The LEA's and SEA's, the schools of education, the regional centers, are still not producing any logical preservice/inservice learning continuum for the American building administrator.

4. The typical five year old comes to school ready to learn. Whether from the affluent suburbs or the embattled inner city ghetto that five year old is ready to take off and then becomes deadened. And the typical American fifty year old is now also ready to go back to school, and we in education are still not ready to take that live five year or that live fifty year old with life long learning concepts and do something with that beautiful ability and that motivation.

5. The promise of American life for the handicapped will not occur just because of Public Law 94-142. It will occur only through technology when people create the circumstances, the conditions and the implements that are the great equalizers. And only then, will the promise of American life, first class opportunity for citizenship and equal education opportunity, be offered to the full range of handicapped in this country.

6. It's a time for communications and cooperation. It's still a time for innovation despite the retrenchment that we are all talking about. One example concerns enrollment decline. When we have declining enrollment in an elementary district, as we do in most districts, our automatic response is to close the elementary building, knowing full well that within six or eight academic years there will be an upswing again with more children in kindergarten. We should not be closing the building without comprehensive thinking and planning. We should be

sitting down as local education agencies, with health agencies, recreation departments, senior citizens, service organizations, and local business and industry who undoubtedly would like to have training programs for employees and potential employees where they live. We should talk about the multiple potential use of buildings we are about to close, rather than closing them because we can't figure out how to use them only for basic education for kids ages 5–12 or 13. It's a time for cooperation and a time for communication.

Introduction

William L. Smith, U.S. Commissioner of Education, Department of Health, Education and Welfare

Whenever the subject of technology arises in reference to the responsibilities of education, I'm reminded of one of the most famous and fateful incidents in the Bible. You will recall that the Lord summoned Moses to the top of Mount Sinai. There he appeared to Moses in the form of a fiery cloud and there—to the appropriate accompaniment of thunder and lightning—he presented Moses with the Ten Commandments.

That, so far as I know, is the earliest recorded use of audiovisual technology for mass education.

I suppose cynics—then and now—would suggest the whole approach has been under a cloud ever since, if not under fire. I think we do agree that its impact on that first occasion was less than lasting. Indeed, there is still room for argument about whether the problem was with the "instructional device" or with the "instructional materials." For today, there may well be more people who "know" about the *display* on Mount Sinai than there are those who practice the *lessons* of the Commandments.

Centuries and centuries later the name "Gutenberg" quite rightly acquired monumental stature in our history. At last symbols began coming directly to people. The invention of movable type meant that messages could be transmitted to spiraling numbers of people. Thus, the age of mass communication was born in the 15th century with the coming of the printing press. This was the technological era launched by Gutenberg. We might say this was the beginning of the print-dominated culture—an era which later became the basis for the purposes, the content, and the methods of American education.

In the late 1930's, the great essayist and novelist, E. B. White, sat in a darkened room and watched transfixed as a big electronic box began projecting eerie, shimmering images into the world. It was his first introduction to something now called TV.

White commented:

> I believe television is going to be the test of the modern world, and that in this new opportunity to see beyond the range of our new vision we shall discover either a new and unbearable disturbance of the general peace, or a saving radiance in the sky. . . .

More than 40 years have passed, and TV has, to a remarkable degree, fulfilled both of E. B. White's predictions: It has—at once—become both "an unbearable disturbance" *and* "a saving radiance in the sky."

All across America tonight, millions of families will be transfixed by their glowing TV screens. Millions of people will be spending from 3 to 5 hours in their darkened rooms—watching, listening, absorbing, and soaking up the messages of others.

As teachers, and trainers of teachers, grapple with the diverse factors that can lead to effective use of educational technology for both the professional and the student, we know that there is yet another string to the television bow: The video tape player and the video disc machine.

Thus, technology moves on and on. It has become a vital part of change, which has always been inevitable in human existence.

Without question, technology has broadened the horizons of every man, woman, and child throughout the centuries. It has multiplied their strength many times.

Consider how technology has helped the handicapped. For example, everyone knows that through power-assisted controls a handicapped person can now drive a car.

Much less known is the fact that our whole telecommunications world developed from an invention intended to help those handicapped by loss of hearing. I am referring, of course, to the telephone. An educator of the deaf, Alexander Graham Bell, sought a way to amplify sound for the deaf; neither he nor the people of his time envisioned the telephone as a means of mass communication.

Like the telephone, some of the most important advances in educational technology were first used to reach the handicapped, and later adapted or modified for use in the general classroom.

Americans of the 1980's will face innumerable information needs. In many ways, educational technology in schools and libraries can meet these needs. But if this effort is to be nationwide, there must be a central, coordinating force.

The Office of Education—in the judgment of the Office's Task Force on Education and Technology—should be that central, coordinating force. This responsibility would be inherited by the new Department of Education.

People must be taught about technology, must be shown where and how it has served—and can serve—educators and the education process.

Excellent instructional programs must be produced and made accessible throughout the nation. Research must be intensified. At all levels, the teacher and the learner—in schools no matter how remote, in the library, and at home—must be supported.

Here again the Office, and later the Department of Education, must assume and maintain a leadership role. In other words, the Task Force believes, as I believe, that the Federal Government needs to be a working partner in the enterprise of educational technology.

In February 1978, the Task Force thought it essential for the Office of Education, under the leadership of the Commissioner, to carry out these missions:

- Increase the use of educational technology and learning resources and ensure equal access for all students;
- Exploit more fully broadcast and nonbroadcast technologies, such as cable television and video cassettes;
- Initiate and support regular research and evaluation to strengthen applied educational technology;
- Broaden the training of professionals for work with all kinds of learning resources;
- Expand lifelong learning opportunities so that options are equally accessible nationwide; and
- Consider ways in which the Office can reorder its components to aid completion of these tasks.

As the lead agency, the Office, or soon-to-be Department, of Education must adopt new practices and refine existing ones so that society can reach two objectives quickly. These are:

To develop critical skills needed for information literacy, and

To provide *every* learner, through educational technology and learning resources, with equal access to —

Excellence;

Appropriate, individual educational opportunities;

Qualified educational professionals who regularly renew their teaching skills; and

A lifetime of learning—through technology—in schools, at home, at public libraries, and within other community settings.

Researchers *have* learned some realities. They have found out that educational technology can:

- *Provide increased educational quality for all*, whether with award-winning TV programs such as "Inside/Out," "The Electric Company," "Sesame Street," "Villa Alegre," and "Footsteps."
- *Upgrade through staff development skilled teachers, teacher-trainers, and administrators;* and
- *Develop favorable cost benefits.*

To illustrate this last point: Credit-seeking students in Miami-Dade Community College's "Open College" take courses at home through a mixture of open-circuit television and radio, text, workbook, telephone calls to instructors, and computer-produced, specific reports on their individual progress.

While information resources seem to be almost infinite, access to them is erratic. Education might learn a lot about improving access to information resources from business, industry, the medical profession, and the applied educational technology which was first designed to help the handicapped. I mentioned earlier how Alexander Graham Bell designed the telephone specifically as a means to amplify sound for the hard-of-hearing.

Here are a few other examples which hint that the revolution the President's Commission on Instructional Technology speculated about in 1970 at last may be here.

- Warner Communication's "QUBE" (pronounced "cube"), a 30-channel, two-way cable system in Columbus, Ohio, is one of only five *interactive* systems in the world. For a monthly fee of $10.95, a QUBE subscriber receives a book-sized computer terminal which is attached to the television set, and a hand-held console. This console, with its program-choice buttons and response buttons, permits the user to vote in a poll, rate a show, or take part in a talk program.
- During 1977, 1,400 Texas Instruments employees worked at learning consoles and received 168,000 hours of instruction by television.

And, far beyond the laboratory walls the computer serves as a many-purpose tool. It controls a blast furnace. It maintains a spare-parts inventory. An automobile mechanic must be able to service the Cadillac Seville's onboard computer, which tells the driver the miles to a destination and the expected time of arrival.

Today's supermarket has a check-out counter computer; it itemizes the cost, the article, and, if needed, the quantity of grocery purchases. In addition, the supermarket manager's computer shows day-to-day price changes and provides an inventory listing.

The bank customer can withdraw money, or switch savings to a checking account, by using a simple electronic terminal outside the bank.

Clearly, technology and media are deeply implanted in our culture. Our society at the beginning of the 1980s is coming close to implementing the 1970 Instructional Technology Commission's concept of the merger of education and technology. This concept is embodied in a definition that is still useful today; that is—

> Educational technology goes beyond any particular medium or device. In this sense, educational technology is more than the sum of its parts. It is a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based upon research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective learning.

The Task Force adopted this definition: Educational technology should mean *a systematic reordering of the teaching/learning process*. As used here, the term "Educational technology" signifies software and its design, and *not* gadgetry alone; hardware items are merely supporting members.

I believe that educational technology, defined in this broad sense, can effectively guide learners through an ever-growing world of knowledge. Capitalizing on that system, we can move ahead with the job of teaching people to live in a world with the smallest possible gap between the developers, the transmitters, and the consumers of knowledge.

I would be remiss if I failed to talk briefly about the teachers' and the learners' acceptance of educational technology.

As we know, our old habits and ways of thinking are slow to change. Thus, American education has been slow to respond to the potential of the technology now available.

We know that quality and relevance of course materials bear heavily upon whether teachers will accept technology. What appears to be even more critical are attitudes with respect to the environment in which the teaching-learning process takes place and what is brought into it through technology.

Teachers and learners are confronted by a disturbing problem of exercising responsibility of choice at a quality level. Making the proper choice is part of the philosophical debate over accepting the options offered by technology.

Why doesn't the school learning environment admit more technology and use it? A teacher decides to use or not to use technology according to his or her perception of how technology affects the concept of self as teacher.

What questions go through the minds of teachers faced with choices to use technology? They often seem to be:

- How will my role as a teacher improve with educational technology?
- Will my students' development improve when more options and choices are made accessible to them?
- What will happen to our relationship?
- What effect will environment have on my teaching?
- How will the new activities supplement some of the things I do now?
- Will I have to be trained or retrained to use the new technology? And do I want to be?
- Do I believe that the extra effort and trauma of change will make me a better teacher, and help my students learn more?
- Will it make my work easier or harder?
- If the technology really works, will I be working myself out of a job?

- If I am going to use technology, how do I check it out first, so that I know it fits my needs and my students' needs?
- And if I want to use technology, how do I bring it under my control?
- How do I have something to say about the content and quality of what comes in?
- Who will pay for the technology?
- Will there be adequate support from the administration, school board, and taxpayer?

The range of questions runs the gamut from the self-serving to the professional. It is too easy to blame teachers for failing to make use of the benefits of technology in teaching, thereby denying to students the benefits of technology in learning. The teachers' questions are relevant; and for the most part there have been few convincing answers.

I was pleased to note that recent research indicates elementary and secondary school teachers are now more responsive to using instructional television. There is likely to be a positive swing toward technology in teaching and learning—toward a teaching and learning environment served by technology—only when the answers to these questions (many of them philosophical) become more satisfactory than they have been in the past; and when government, school administrators, and professional organizations undertake the serious and much neglected task of setting educational priorities on the basis of values to individual learners and society.

If the American teacher and the American learning public (practically all of us) make a value decision that technology improves opportunities for learning, enriches the profession of teaching, and strengthens our society because of the quality and diversity of its human products, then the other problems that beset educational technology will also be solved. For they, too, stem from an uncertain and immature philosophical base.

In closing, then, I say, ''thanks be'' for the resources of educational technology now available to us as we seek to improve our system of education and make its promise a reality.

Thankful we should be too for a growing understanding and acceptance of the realities of what must inevitably be a new era of technologically oriented education.

A certain maturity of attitude has been achieved in relation to the new technology. Discarded for the most part now are the fallacies that saw technology on the one extreme as the solution to all of education's problems and, on the other hand, as a mere excess of gadgetry that could only add to those problems.

In other words, in an effort to mesh technology and education, we are beginning to come of age. I remain optimistic. For I believe that this maturity will hasten the time when there will be sufficient financial support for, and sufficient knowledge of, the special strengths of educational technology.

It is, at long last, possible for educators to learn how to use sophisticated systems that will indeed individualize instruction. This will make teaching and learning more humane and more adaptable to the various styles and techniques of thousands of teachers practicing that vital and complex art of teaching.

But please remember: however much things change, some things remain the same. The devotion of teachers endures—helping to change, for the *better*, individual lives—and the nation.

Implications of the Expanding Use of Educational Technology in Education and Training

Robert Heinich, Professor of Education, Indiana University, Bloomington, Indiana

First, I want to mention that all of the basic ideas in this paper have been formed out of my experience in the public schools. In addition, I would like to mention that part of the discussion of legal aspects that I am presenting I owe to the opportunity NIE gave me a couple of years ago to study legal barriers to educational technology[1] and also to the Commissioner's Task Force on Educational Technology that was chaired by Malcolm David for the opportunity to put together additional thoughts on institutional barriers to educational technology.[2]

Wrong Assumptions

I want you to examine with me some rather abstract notions to set the social and cultural context for the use of technology in education. I would like to begin with two wrong assumptions that we frequently make.

The first assumption is that because our culture in general, the culture of the United States, welcomes the introduction of technology and facilitates its use, we tend to assume that all of its subcultures do. That is why we often think that building better mousetraps will do the trick. All we have to do is hit on the right, good technology and everybody will beat a path to our door. It maintains our faith in hardware. But the basic structure of the subculture is not the same as the larger culture. The historian of technology, A. Rupper Hall once put it this way: "Scientific knowledge is of little material value if the object of technological proficiency is the manufacture of objects of luxury. Hence, in backward contemporary societies the arbitrary installation of a few modern industrial plants without modification of the basic economy, has little more result than to allow the rich to adopt Cadillacs and television in place of more barbarous means of ostentation." I would maintain that for the most part educational technology falls in the category of luxury. Now as to what more barbarous means of ostentation educators might adopt, I'll leave to your imagination. Hardware does have its place. I don't want to denegrate the importance of sophisticated hardware but it is not the key. We have to see if the structure of education facilitates technology.

The second assumption is that, perhaps because we happen to be in a knowledge-based occupation, we like to think that people act on the basis of research. If we just do the right research, people, again, will beat a path to our doors. This maintains our faith in research. It also helps to keep the research community solvent and as an editor of a research journal I don't want to knock that. But it is not the answer to the problem. Both the successes and failures of instructional technology are not related to research. For example, one of the most widely accepted modes of instruction based on technology we have today is Sam Postlethwaite's audio-tutorial system of instruction. Sam didn't know about behaviorism when he invented the technique—he didn't know anything about educational technology. He invented it out of a need that he had. After it proved to be successful we did some after-the-event research confirming certain aspects of the method. But the idea, the installation, and its rapid, widespread adoption had nothing to do with research. On the other hand, one could point to what happened to programmed instruction which was a techology based more on laboratory research than virtually any other technology I can think of. It had nowhere near the wide and rapid acceptance of the audio-tutorial lab. Research does have a function which I'll mention later.

Technology and the Social System

I would like to examine two premises about technology and the social system within which it operates. First, as technology becomes more sophisticated, and more pervasive in its affects, considerations of its use must be shifted to higher policy making levels. Let me give you first an illustration from industry rather than from education. For example, if one wants to adopt a better tool to use in a lathe operated by a mechanic, the decision to use that tool in the factory can be made on a fairly low level. It doesn't really affect anything in the basic operation, simply makes it a little more efficient. Now if someone wants to replace that lathe and operation with an automatic lathe then consideration for that technology is bumped to a much higher policy making level: to management. In education, compare the use of an overhead projector in the classroom which doesn't affect power relationships at all, to the installation of a comprehensive television system, which affects the whole system. Consideration of TV is at a much higher policy level. This should tell us somethings about who our clients are when we want to introduce sophisticated, high technology.

The second premise is closely related to the first. Social scientists frequently make a distinction between the *base* of the social system and the *superstructure* which evolves in support of the base. The base may be, as it is in education, a fundamental premise that defines operational relationships and inverts authority. The superstructure is the pattern of institutions, laws, organizations, traditions, and habits that support, reinforce and maintain the base. If new developments imply a new base for the system, the superstructure of the existing base acts as a major deterrent to change. When this type of power struggle arises our typical diffusion and adoption practices are of limited use, because they are designed to bring about change within a given and accepted set of fundamental relationships.

Technology vs Present System

When formal education evolved in the United States, assurances of quality instruction had to be obtained by relying on the credentials of the person responsible for instruction. For example, the classic Carnegie unit is defined in terms of hours spent in a classroom with a teacher who has taken a specified number of college credits (defined in a similar manner) in an accredited institution. In other words, the fundamental premise—the base—of education is that responsibility and authority for instruction is vested in the person in face-to-face contact with students in the classroom. A superstructure has developd over the years to maintain and support this fundamental premise.

Technologically based instruction poses a threat to the base of our present system and the more comprehensive the technology, the greater the threat. When instructional technology becomes sophisticated enough to be considered an alternate, rather than a complement, to traditional instruction, it becomes a base for the design of a new educational system—or for the considerable and drastic modification of the present one.

Instructional technology becomes an alternate to traditional instruction when it has the capability to take over the initiative for, and the main burden of, the instructional task. Television, filmed courses, programmed instruction, computer administered instruction, and audio-tutorial methods are examples of technologies of instruction that can take over the main responsibility for instruction. They are both qualitatively and quantitatively different from many of the devices that intended to complement instruction: for example, the overhead projector, slides, individual films, and so on. The latter do not disturb the power relationships in the school. Teachers intuitively recognize the distinction by reducing all instructional technology to complements of their own instruction: reserving the right to turn televised instruction on or off; using programmed instruction for remedial purposes rather than for mainline instruction; picking and choosing from a filmed course rather than using it intact, etc. Doing so keeps their power base intact. The right to make those decisions, decisions that effectively prevent institutionalization of instructional technology, are supported by the present governing structure of education. And that structure does not facilitate the use of technology as a base.

Addison Trail High School—A Case History

What are the elements of the superstructure I'm talking about. Some of them are legal, some are quasi-legal and some are organizational. Certification is an example. To illustrate I want to use an interesting case history.

In Fall 1971, Addision Trail High School had one more typing class than staff could teach. After clearing the procedure with appropriate county and state officials, the high school started teaching the extra typing class by closed-circuit television with a paraprofessional overseeing the TV class.* The local teacher association protested the action to the state department. After due deliberation, the state department notified the district that it could continue the class for that school year but it would have to stop at that time. In the meantime, the state department would obtain a legal interpretation on the use of teacher aides. In June, 1972, the state department notified the high school that the legal interpretation prohibited use of non-certificated personnel in a situation requiring instructional judgment or evaluation unless under the immediate supervision of a certificated teacher. Immediate supervision was interpreted to mean *in the same classroom*. Note that this was a legal interpretation by the state, not by a court.

The district continued negotiating with the state department with some success. In June, 1973 (one year later), the state department reiterated that the definition of supervision in its *Formal Legal Opinion Number 8* did not extend to the use of non-certificated personnel as described in the high school's proposal. *However*, the state department went on *in the next sentence* to apprise the high school of new state regulations, approved *February, 1973*, regarding the use of non-certificated personnel. Under the new regulations, the state department was able to approve the high school's program for the 1973–74 school year! Two provisions in the new regulations enabled the high school to continue its program. First, immediate supervision was redefined to mean *continuous management* of the teacher aide's activities. Second, the qualifications for a teacher aide included the stipulation of at least thirty semester hours of college credit. The individual used by the district attended college three years.

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* All information about Addison Trail was obtained through correspondence and interviews with the principal of the school.

By satisfying the immediate demand, the state department in effect kept the innovation localized and eliminated the need for the district to sue. Although the district could have sought redress in the courts, the district was not interested in pursuing a point of "law"; it simply wanted to teach a class by TV. Because the legal question was not settled in court, the June, 1973, letter from the state department begs the question: If another high school in Illinois wants to introduce a similar program, will the state department quote *Formal Legal Opinion Number 8* or the February, 1973 regulations?

Perhaps because of this "quasi-law" approach to certification, I have found not a single litigation that challenged the authority of the state to set staffing standards. But *can* the state department presume to specify staff requirements of a school district? The question is asked this way because that's the context in which the legal issue may be raised. Shouldn't the school's effectiveness be based on output rather than input? It so happens that the students in the TV class performed slightly better than the students in the class taught directly.

Accreditation

Accreditation tends to work in very much the same way. The United States is divided into six regional accreditation associations. While each of these associations has rules slightly different from the other, they consistently bias the organization of schools along traditional lines. For a variety of reasons, schools want to be accredited and the easiest way to gain accreditation is to organize their schools according to the forms supplied by the accrediting association. While departures from these forms are permitted, it takes extensive documentation on the part of the high school seeking such departures. In other words, departing from the norm is much more difficult than adhering to it. And, incidentally, the Federal government helps reinforce the accreditation system by distributing certain programmatic funds only to accredited schools. Being accredited gets the money, not being accredited doesn't get the money, so a school doesn't want to experiment with anything that is liable to jeopardize accreditation. State aid formulas have traditionally acted as a deterrent to the introduction of technology. In a vast majority of states the traditional means of distributing a significant portion of state aid to the schools was by way of the instructional unit. This consisted of a certificated teacher plus a specified number of students, usually 25-30. When such a formula is used, instructional technology is discouraged because it costs the school district money. Whenever the number of cetificated teachers is reduced in proportion to the same student population, the school district loses state aid: for example, if the school district taught physics by using the old Harvey White physics film series. The course on film costs the school district the state aid it would normally get for a teacher physically present in the classroom.

Professional Negotiations

But perhaps the most important deterrent to the imaginative use of technology is in the area of professional negotiations. Teacher groups are replacing the state as watchdogs over certification, accreditation and so on. Because from their point of view, the states have become too conservative. Very recently, the state of Colorado eliminated all state minimums in reference to teacher/pupil ratios, etc. There is some interesting speculation on why the state has done this. So I called an administrator friend of mine and asked him about the effect of the new policy. His opinion was somewhat similar to my own that one of the reasons for doing it is that local teacher groups have found that they are now strong enough to be able to argue for what they would consider to be better arrangements and more stringent minimums. They tend to be held back by what the state would consider to be minimum standards. The teacher organizations are tending to replace the state as a defender of that area of the superstructure in education.

The problem, in my opinion, is that teacher organizations at the present time are operating on the kind of craft union basis that unions in general in this country have long been forced to abandon. They are taking an extremely narrow view of pupil/teacher ratios, permissible deployment of technological resources, etc. They are going to have to come to the realization that long term gains are going to have to be achieved by eventually facing the issue of productivity in the same sense that other unions faced that issue a long time ago. Another interesting legal question is whether school boards can legally negotiate away certain policy matters. There are a growing number of court cases that are being decided on a state by state basis on this issue. We in technology tend not to pay attention to these questions because we are not in the habit of thinking that what we do is influenced by such events on the state level. For example, I know that the state of Colorado legal opinion of the courts now is that since the responsibility of education has been delegated to the state, the school board as a legal agent of the state cannot negotiate on certain defined policy matters. They can only meet and confer on them. It is our responsibility to point out to governing boards how those policies affect educational technology.

Education Superstructure Discrimination

State departments of education traditionally have served as gatekeepers in protecting the superstructure of education. When I was doing the study for NIE, I talked at length to Byron Hansford, the Executive Secretary of the Council of Chief State School Officers. In his opinion, when we talked about the legal problems involved, state departments tend to interpret the education codes very conservatively. Two years ago, a student of mine presented to the fifty state departments a scenario similar to the Addison Trail situation. The vast majority of respondents claimed such an arrangement would be legally prohibited in their states.

Let me illustrate one other example of how the superstructure of education tends to discriminate against technology or biases the system. . . . School districts make artificial distinctions in instruction that tend to work against the use of instructional technology, and those distinctions are reinforced by federal and state models for reporting school budgets. The Harvey White physics course on film that I referred to earlier can be used as an example here also. If Harvey White were to teach a course in physics for a high school the money to pay him would come out of salaries—no problem. However, if the school district used the Harvey White physics film series—162 half hour films—the money to pay for them would have to come out of supplies, a decidedly smaller part of the budget and one made very vulnerable by teacher salary demands. In other words, it is easier to hire an individual to teach a course than it is to get proven materials to teach the course. This process in and of itself can make it more difficult for school districts to buy instruction already prepared in the form of instructional technology. It should be mentioned that the question of state aid also comes in at this point as I indicated before.

Higher Education Biases

So far I have been emphasizing public schools. Much of what I have said could apply to higher education, too. In higher education, the mode of production is biased by budgetary practices in the sense that credit for tuition always shows up in full-time-equivalence in reference to faculty, not in terms of technology. If a department teaches a course by means of technology without having an instructor of record assigned to that course, the department may be penalized by having part of its full-time-equivalent faculty lines taken away from it. Our own department faced that issue several years ago. We could have taught a course by technology without an instructor of record. But the system worked against us in that we would have lost budgetary allowances that were important to have. We taught the course but we used an instructor of record to preserve the budgetary effect. In other words, there is no incentive for a department of the university to become more cost-effective.

There are many other ways that budgetary practices in both school districts and higher education inhibit instructional technology. An interesting current example on my own campus involves our attempts to use underprogrammed faculty in certain outreach programs. Because of university regulations, a department head cannot assign correspondence courses as part of faculty load. On the other hand, a faculty member can go to continuing education and offer the correspondence course for pay. This could easily result in the strange situation of a faculty member getting paid to teach a course for which he is underprogrammed on the campus.

Reward Systems

Now let me mention something about reward systems. Teaching has unique characteristics not typical of other crafts. There is no public accounting for the quality of the work done. Evaluation is private and both administrators and public must accept the craftsman's evaluation of his own performance. Neither the number of next year's students nor next year's pay will be changed by what happens instructionally this year. There is no mechanism for weeding out the marginal producer. There is no mechanism to reward productivity.

SUMMARY

All of the above are examples of how the structure of education is biased against the use of certain uses of instructional technology. We need to examine them carefully to determine what kinds of changes would be advisable and necessary in order to change the rules of the game so that technology could operate and compete successfully. I'm not talking abut overthrowing the school system. Somd people may be thinking that I would be in full support of educational vouchers—absolutely not. Educational vouchers, as far as technology is concerned, couldibe retrogressive, because they freeze a cost per unit on the system.

Sophisticated hardware does add pressure and, of course, potential by making alternatives available—alternative modes of instruction. In fact, it would not surprise me to see current pressures, including cost for transportation, forcing us to deconsolidate a number of our school districts and reinvent education as a cottage industry on a technological base.

New technologies, particularly systems based on new technologies, are not "proven" or "disproven" by one shot experiments that may be measuring unimportant comparative features. For example, if educational researchers had been around at the time of Gutenberg they would have conducted an experiment comparing learning from print and learning from illuminated manuscripts. They would have found no significant difference, urged the book be scrapped, and would have totally ignored the potential in the real difference between the two. The technology of print broke the monopoly of the church on knowledge. But to do so it needed time, faith, and an environment that tolerated its slow early growth and then facilitated its rapid expansion. Research *is* useful in helping to improve significantly the technology that is being facilitated. In education, however, we need first to create an environment that finds the products of technology both useful and desirable. Without that environment the products of educational technology will remain the objects of luxury, in a system that can no longer afford luxuries.

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The Need for the Classroom Teacher to Play Major Role in Planning Stages

Phil King, Manager, Public Information Office, National Education Association, Washington, DC

NEA's policy on instructional television accurately reflects the concerns of the Association's Board and 9,000-member Representative Assembly for the broad range of educational technology in the nation's classrooms:

> "The agencies responsible for the education of children and youth have a public charge and responsibility to introduce and to experiment with new developments, techniques, and resources in order to find the most effective approaches to providing a quality education for students at all levels. Within this context, instructional television should be recognized as an integral part of the total educational program and should merit the serious consideration and cooperation of educators in all areas of the instructional program."

As many of you know, the NEA has had a distinguished track record in the past quarter century in the field of educational technology. Let me itemize a few of the highlights:

1. NEA was a founding member of JCET in the 1950's, and it continues to play a leading role in protecting the reservation of TV channels for education.
2. In the 1960's, NEA played a prominent role in the expansion and utilization of Instructional Television Fixed Service, a multiple channel microwave service for schools primarily in urban areas.
3. At the request of UNESCO, NEA conducted an educational needs study for Alaska with implications for satellite communications to meet some of the crucial needs of Alaska natives.
4. NEA organized CINE, the Council on International Non-Theatrical Events, which has had phenomenal success in processing outstanding non-theatrical films to represent the United States in overseas festivals.
5. The NEA formed PUBLI-CABLE in the 1960's, to protect through consortium the public interest in the development of cable television.

6. NEA was the first major national organization to recommend selected commercial television broadcasts to its 1.8 million members beginning in 1969. By means of its own sophisticated communications network, NEA now has the capability of guaranteeing a viable audience for quality programming which might otherwise not be broadcast.
7. For the past six years the NEA has pioneered the use of satellite communications in its own program to communicate with its members. Beginning with Alaska, the program has been expanded to include Hawaii and Appalachia. Two satellite experiments were particularly noteworthy: (1) The Pan-Pacific Satellite Project—designed to provide two-way communication via satellite *radio* between teachers at 12 South Pacific, 6 Alaskan and 6 Appalachian sites; and (2) APPALASKA INTERCOM, a satellite *television* experiment for teachers in Appalachia and Alaska. Four satellites were interconnected by NASA, PSSC and Appalachia Educational Satellite Project for this experiment.

Recently, a contract was signed in San Diego at the annual seminar of NEA's Public Relations Council, calling for an unprecedented collaboration between teachers and the television industry. The National Education Association and American Broadcasting Companies, Inc. have agreed to jointly produce and supply a unique program of video instructional materials designed to provide the upper elementary grades with materials to supplement classroom instruction. Service to the schools is expected to begin by 1981.

The contractual relationship between our organizations was proposed by ABC in 1979. The details of the collaboration have been negotiated by the National Foundation for the Improvement of Education. NFIE is an educational and charitable organization incorporated by the NEA in 1969 to identify, investigate, and solve major educational problems both at the national level and through the funding of teacher-directed projects in local environments.

The curriculum elements of the package will be developed by experienced public school teachers selected by the NEA to work in close collaboration with the creative program staff of ABC. Initial production and marketing plans call for approximately 20 hours of video instructional materials — one hour every two weeks — during the 10-month school year.

The materials will be designed to meet the knowledge and interests of fourth, fifth and sixth graders. The material will be innovative in approach, concentrating on providing sequential experiences designed to enhance the basic learning skills being developed by the classroom teacher.

In announcing the collaboration, NEA's Executive Director Terry Herndon commented,

> "It is absolutely essential that educators seek creative ways to enhance the utility of the television medium as a major instructional resource for teachers. I believe," Herndon said, "that a teacher-designed instructional television service, such as that now in development by ABC and the NEA, has an enormous and largely unexplored capacity to assist teachers in teaching children how to challenge, hypothesize, inquire, document, evaluate and make intelligent choices."

Each hour of video material will consist of several different elements, one of which will be a message from the NEA to school personnel relating to the professional needs of the teacher, and one of which will be related to news and current events. Other elements will be directed toward the sciences, the social sciences, the arts, and the humanities.

The basic goal of the project is the over-arching goal of education: to develop informed, thinking, participating citizens. In all curriculum areas, students learn about their world and its heritage while they deepen their skills in language and reasoning and acquire the basis for emotional and social growth. This interdependence of skills and content is the central concept of the program.

The new video disc technology, which was also announced last week as a joint goal of both RCA and CBS, is being studied as a means for distributing the ABC/NEA program to the schools.

Let me conclude by saying that the National Education Association strongly supports technological developments in education, but it wants these developments to be carefully planned—and it wants the classroom teacher to play a major role in the planning stages.

About half of the nation's 2.2 million public school teachers express positive attitudes toward televised instruction today, and about a third of them indicate that they've actually used television as a teaching tool in the most recent survey.

The typical elementary school teacher who is trying to lay out a flow of work over a forty-week period has no particular interest in or need for a piece of film because it happens to be scheduled on PBS at 10 o'clock on Tuesday morning. If that particular program on Tuesday morning is not in some way related to what has happened on Monday and what is planned for Wednesday, then it becomes a distraction from the flow of classroom events.

That is why the NEA wants the classroom teacher to play a major role in the planning stages.

Preparing for the Future

Elizabeth L. Young, Ph.D., President,
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I was reminded recently just how fast new technologies are expanding and changing our lives when I talked with one of PSSC's members for whom we have coordinated several teleconferences. The person who usually comes to us with the request that we acquire satellite time was telling me that she had made one request for a price quotation in January of 1979 and then another request for a quotation in March of 1979. The difference between the two quotations was substantial. When she asked our Operations Coordinator why the difference over a three month period, our staff person responded, ''But Marcia, that first price was from the old days!'' I would submit to you that when 90 days separate the ''new days'' from the ''old days'' we are indeed living in a time of almost unbelievable change.

How to cope: that is certainly the question. We are reminded of the line from ''Alice Through the Looking Glass'' — ''I have to run this hard just to stay in place.'' But sometimes even finding the track to run on can be a challenge. To illustrate what I mean, let me share with you just a bit of the background of the PSSC and then turn to some suggestions about meeting the challenge.

BACKGROUND - PSSC

Our non-profit, membership-based organization was incorporated in 1975 with assistance from HEW and NASA. The impetus came from the non-profit, public service sector which saw the advent of communications satellites as a great boon to communications but only if commercial interests did not preempt all the space and time. There was a clearly felt need to band together, and PSSC became the spokesman for the interests of those in health-medical fields, in education, in religious communications, in library science, in government, and in public broadcasting. Some of our time in the period between 1975 and 1978 was spent in trying to ascertain how communications policy was being made in this country and how we could affect it to benefit our members, who by now have grown to 108 organizations. Much of our time was spent coordinating experimental uses of communications satellites, working with the NASA ATS series and the joint U.S.-Canadian satellite, CTS or Hermes — they helped us learn more about how to define the needs of the segments of the public service community with which we were working.

By 1978, however, it became apparent that the period of experiment, short as it had been, was drawing to a close. With commercially owned and operated satellites available to provide service, and with NASA's avowed interest in turning existing and potential users over to these available spacecraft, our job became the aggregation of the public service market. If you like, please read "selling" for aggregation. But whatever you call the task, what we began doing in 1978 was finding likely entities — whether schools, colleges, hospitals, libraries, or federal government agencies — who had well defined needs to communicate across long distances. The satellite, being distance insensitive, is best at creating these kinds of networks. Very rapidly we moved into an era in which a new technology was almost a commonplace and yet many people still did not understand the first thing about how it worked, let alone about the advantages in using it.

A Turn Around in Satellite Time

Meanwhile, there was an almost complete turn around in satellite time availability. While in the mid-seventies Western Union and RCA (the two owners of the available commercial satellites) were holding on to unused transponders and wondering anxiously who would lease them, by the end of 1979 with 108 transponders available nearly all were spoken for. And, in October, 1979, the Federal Communications Commission deregulated the ownership requirements for receive-only earth terminals, virtually guaranteeing a burgeoning market for the antennas. Among the first to understand and exploit the new uses for satellites were the cable operators and commercial program syndicators. The marriage between satellites and cable was hardly "shot gun" but it was swift. In effect what has been created is not one or two new program networks but many. Home Box Office was one of the first to see that by feeding a movie or package of movies to subscribing cable systems all across the country, an efficient new delivery system had been born. And public broadcasting stations, not always known for technological innovation, converted their networks to satellite, beginning in 1977 with the public TV stations and expecting to conclude in 1980 with all of the National Public Radio Stations served as well.

What all this has meant for PSSC is that the hardware is either in place or available for the delivery of a variety of services. The trick is educating our members and other potential users, demonstrating cost effectiveness, and bringing together enough interested users to use the systems economically.

Between August, 1978 and October, 1979, 16 teleconferences were coordinated, with additional transmissions scheduled for each succeeding month through March, 1980. Additionally, in concert with the Greater Cleveland Hospital Association and the American Hospital Association, PSSC began a program service to patients in hospitals whereby through a combination of satellite transmissions and local cable feeds they could see programs especially tailored to their health needs. AHA's membership of some 7,000 has the potential for using many hours of satellite time not only for such a patient educational network but for staff training and continuing professional medical education. Other organizations such as the National Catholic Conference and the American Library Association are looking at similar kinds of networks. More than half of PSSC's membership are national or large regionally based service organizations who have members in many locations. The critical problem is information and service delivery.

International Operations

PSSC is becoming increasingly active in the international field with members in the Pacific Basin area such as The Aloha System, the University of Guam, the University of the South Pacific, and the Australian National University. International transmissions are, generally, more complex than those done domestically and will often involve use of more than one satellite. We are currently working with several agencies to assess the needs in the South Pacific region where there are few people relatively speaking but precisely because of this where communication needs are critical.

Now that we have looked at what PSSC is and what it does, let me address the issues and problems—as I see them—for those of us who want to plan for uses of new technologies, who currently use them, who want to educate ourselves and others about them, who need to manage them.

A Need for Rudimentary Knowledge

Clearly, we need to have a rudimentary knowledge about how these technologies operate. By that I do not mean that we all must take off two years, go back to school, and get a degree in engineering. You would be amazed how much you can learn just reading the display ads in professional journals! But we do need to seek good, fundamental information. Getting the information is not always easy, and I find myself perusing an increasing number of publications (a partial list of which is appended here). But nevertheless in a field moving so fast and changing so rapidly, the reading is essential.

Another good way to get a feel for what is happening is by going to conventions, conferences, workshops, seminars, wherever there is a forum and it is convenient. And a good way to get information about where such opportunities are is to read the relevant publications and journals.

Assuming that we can all find ways to gain a working knowledge of the "innards" of whatever system we are interested in, an equally critical area (in my view) is finding methods of accurately assessing needs. To begin with, we can probably find three kinds of needs to assess. There is the obvious need to communicate more economically. This need may simply involve finding a better technology to do what we have been doing only with less expense. Secondly, there may be a need to communicate more effectively, that is, to get the message across so that greater retention and action result. Finding ways to meet this need usually involves not only an assessment of the hardware of communications but of the production of software as well. And, there is the need to communicate to more people at a time.

Techniques of Needs Assessment

There are no easy answers to the techniques of needs assessment, although we can learn a great deal from the field of business administration. Sometimes the results of needs assessment involve complex trade-offs. For example, one medium of communication may be clearly superior in getting the message across but may be more expensive than any other means. This is a common finding when comparing audio-visual versus audio-only delivery systems. Does the visual information really make a difference? If so, is it a critical difference?

There is no substitute in needs assessment for knowing your constituency or audience. For example, when PSSC first began working in the field of health care delivery we learned rapidly that we had to work closely with and rely on our own members who were experts in the field. We had no way to knowing what patients in hospitals wanted or even how to find out in such a way that it would result in meaningful programming. Others did know, and they made the programming decisions.

What is perhaps most difficult is assessing needs where none have been perceived to exist. It is relatively easy to determine how to reach more people or to do something cheaper. But suppose there is a new service to be offered, one that transcends anything that was possible or even thought of? Again, knowing your clients helps. Commercial product suppliers are adept at this—we may not have "needed" the food processor in the strictest sense of a live or die need, but it certainly has found a market. In the delivery of public services we need to become equally creative. Sometimes we find ourselves deploring the fact that technology leads or pushes us. But is there anything *wrong* with this if what it means is that the availability of a satellite or a videodisk opens up possibilities for us and gives us the impetus to create new services? I think we know the answer.

Art of Innovation

Beyond knowledge of how technologies work and what needs they can serve, there is a real requirement to understand the art of innovation. Here many of us who are managers and even educators fall short. We assume that if a need exists and there is a way to fill it, people will buy the service or program. We are wrong. Here, too, our commercial brethren have found out that a potential customer needs to be tempted, needs to be flattered, needs to be sold. We may choose not to use these verbs to describe our process, but some process is needed. In studies about innovation, we find that there must be a "change agent" who sees the innovation through, there must be a "fit" with existing belief systems or habits, there must be acceptance by the perceived "opinion leaders" and there must be perceived "pay-offs" or benefits. Innovating with new technologies is not easy. People resist change. They are apprehensive about what they do not understand. We must create artful scenarios of innovation strategies. Then and only then can we deliver what we already know is what is needed.

Finally, once we have educated our constituents, designed the appropriate services and found the best delivery mechanisms and media, sold the concept, we must manage it. Here perhaps the greatest number of convergent talents is required. We all know about good ideas and good products that mysteriously failed. But was there any mystery? Time and time again the answer turns out to lie in the way in which they were managed—or mismanaged. Peter Drucker, the great teacher in the discipline of business administration, would maintain (and does) that good managers are made not born and that anyone can be trained to be a good manager. This may be true, but only if there is infinite time and infinite resources. Therefore, we must find ways to spot the potentially creative managers and nurture them.

Management

Supposing we want to become managers ourselves. Supposing that we want to manage in such a field as cable, or educational telecommunications, or communications satellite services where even the name of the game seems to change weekly if not daily. How do we prepare? The answer may not be as elusive as we think. For good management—whether of a shoe factory, a hospital, a radio station, or a government agency—requires some universal knowledge and skills. Good managers have these skills in common. They are, first, good planners. They know the strategies of evaluation and estimation. They know how to formulate goals and operational methods of attaining them. Planning is (or should be) at least fifty per cent of good management. Secondly, we are all managers of people. People will often be our greatest resource. We are part-time psychologists, if you will, when we are effective managers. Finally, we must be or become managers of money and related resources. This may not require a degree in accounting or advanced economics but it does require the ability to read a balance sheet—and to interpret it to our employees and our bosses or boards of directors.

Managing in the telecommunications field does, of course, require special familiarity with both the delivery systems and with the process of communications. Unfortunately, I know of no departments within existing institutions of education that specialize in turning out managers who deal primarily with media and communications systems. But, on the other hand, we may simply need to investigate what is available from schools of business administration, most of which do offer short courses and workshops, to the offerings of communications and engineering departments which may offer courses to acquaint us with developments in their fields.

SUMMARY

The bright side of all this is that we are in the same boat—most of our electronic means of communicating are so new and evolving so rapidly that no one (or few of us) are truly experts. If ever there was a field in which "learning by doing" could be the slogan, telecommunications in the latter half of the twentieth century is the field.

There are larger issues, too. Issues such as who regulates and who controls the multi-faceted means of sending and receiving signals. Right now, in the U.S., a market place philosophy dominates. The trend is toward deregulation and letting the industry sort itself out. Should we as educators, as service givers be content to have a laissez-faire policy dominate? How do we change it if we are not satisfied? How do we demonstrate that the educational community, the non-profit service community is and will be a legitimate user of new telecommunications systems? Do we really have a constituency to bring into this growing market place? These questions all need and deserve answers but they are appropriate for another forum and another focus.

In the "old days" of the 1960's and early 1970's the concept of communications satellites bringing us sights and sounds from around the world was a novelty, something to be played with but not taken seriously. Today, the satellites are no longer stars that grace our doorsteps infrequently, they are our servants, ready to do our bidding night and day. What shall we bid them do? That must be the question for the next decade.

Identifying Issues and Problems—A Divergent Perspective

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"Professional development emphasized"—I wonder if the emphasis might not be misplaced, and we might not want to change the position of the words to read: "Emphasized—Development of Professionals."

I raise the question in light of the description of the conference which included: "the program will stress successful applications in the telecommunications, computer and other electronics fields with case studies specifically directed toward technical feasibility, cost-effectiveness, social considerations and professional development models."

Now, you are all in this room for the purpose, I assume, of helping us to agree or disagree on the identification of Issues and Problems, and hopefully to listen to Divergent Perspectives.

The reason I am concerned about the conference description is related to the key words in the subject of my presentation, *issues, problems,* and *perspectives*.

Issue

(verb) matter of dispute, to give an order, to cause to come forth, to terminate, *to cause to have a specified consequence or final outcome or result*.

Problem

a question raised or to be raised for inquiry, consideration, discussion, decision or solution.

Perspective

capacity to view things in their true relations or relative importance.

I don't have any personal hang-up in the continual development of professionals, at any level. In the Federal Government, we call it "upward mobility." In academia, it is called "tenure" but really the private sector tells it best—"survivability." And in their world it is much more meaningful if for the only reason someone is held accountable and you can be fired.

However, I do have a personal hang-up about who gets used in the process, who gets abused in the process, all in the name of progress, professional development, make a buck, or whatever today's buzz-word is. What is the price? Historically, schools and those who serve them reflect the kind of educational philosophy and practice of the time. I don't think you will disagree with the premise that education is always and inescapably the agent of the culture by which it is fashioned and endowed. But education also makes possible the great or small innovations, the cumulative readjustments without which, in the history of all cultures, either bring stability, degenerate into stagnation, or self-destruct; and we may be closer than you care to admit.

So what does this have to do with Educational Technology and Professional Development? Not a hell of a lot, if getting ahead at the price of others is your thing. Let's be honest about it—looking after number one is an accepted mode in our maternalistic society. Doctors don't make house calls. Dentists don't x-ray and repair in the same visit. University professors are indignant when asked to teach more than nine semester hours, and bureaucrats, who rule all of our lives, tend to be not only autonomous, but faceless. CMA or cover your butt is daily operational mode. In a nutshell, the only guy who makes mistakes is the President but at least he admits them. Do I? Do you? Do you ever question in retrospect what you had to do, or what you will have to do, to get the money? Do you ever challenge the Feds? Do you ever wonder what's happening to the have-nots? How many times have you turned them on, raised expectations, motivated communities, stimulated the teaching-learning scene, and when the money ran out, walked away, filed your final report, and then attended a meeting like this, and, quote, "stressed the successful applications of satellites, computers, and other electronic fields." I have, I did, and I'm not very proud of myself. I can name you the town, the people, superintendents, mayors, parents, and students, and I know the disappointment, the frustration, the rejection, the isolation I left them with.

Let's collectively question our professionalism, if, and it's a big if with a capital I, we have so many successful technology applications, proven feasibility studies, cost-effectiveness, acceptance, and also addressed successfully, the social considerations, why isn't at least one of these applications being used universally? Why do the 50 million people in this country who live in rural and isolated communities still suffer from substandard education, health care, etc.? Why do Native Americans still barely survive? What about impacted city populations, ghettos, barrios, or those island communities of Puerto Rico, Virgin Islands, American Samoa, Guam, Trust Territory? Technology has failed to get there. We have failed—you, me. We have failed America.

There is a huge unserved user community out there in America, which I don't think Professional Development and Educational Technology either cares about or maybe it's worse, does not even know about.

Permit me to relate my own experiences, which I think, "my perspective," gives me the right to make the statements I have just made. Background: (32 years in media):

- —ABC — newspaper — made money, didn't find much challenge.
- —ETV — first university, philosophical difficulties, did doctoral.
- —ETV — second university, 3 TV status FM, cable system, too big, too fast.
- —STD —fair attempt to serve the have-nots, all ages, massive attempt to assess user needs, real needs not perceived, a totally interactive teaching-learning situation, career development oriented, provided all technical capability, but unable to follow-up, Feds not interested.
- —UNESCO — didn't want to spend the money, might educate people.
- —Iran — NIRT
- —Brazil — SACI, neglected the social consequences
- —Interior — needs assessment, user involvement, to them, by them, for them, it's them, their language, their culture, their system. You know something, it doesn't cost Interior a dime — if there is a moral in Micronesia, it's that people don't object to paying for progress.

So what's the issue — my perspective, the specified consequence and outcome. Do we need to get bigger, more satellites? Do we need to get faster, smaller computers, greater memory? How much longer do we permit the manufacturers to drive the system? The basic research is complete. The libraries are full of expensive research, and the same agencies continue to fund more of the applied and developmental work you can quote—author, chapter and verse is complete. It's time to operationalize—software, people involvement, results. If we are so good, let's prove it.

What's the problem — The question I raise, where is the leadership? Who leads the charge? Who dares to be different? Who starts serving all of people in America? If it's not in this room, it may not exist. The decision or solution is yours.

Perspective — my capacity to view things in their true relations or relative importance. I am convinced that our Achilles' heel, as professionals and technologists, is that we have become so caught up in things—gadgets, machinery—that we have lost sight of that mass out there called people. Where have we failed? The technology works, but its use is not universal. Is the software inadequate? Do we permit or are we interested enough in the recipients to get *them* involved?

Let's face it, the probability of your success is positively correlated to working in urban areas, schools, universities, television stations, but do you accept what is going on? Can you deal with it?

Enrollments are on the down side, both at the public school level and at institutions of higher education. But surprise, 20 percent of the adult population is currently involved in continuing education and indicators would have us accept that just as many are involved in nonformal education. To me, these figures pose the key question—does education in its totality need to redefine its role? Is what we do mired down in tradition? Is it obsolete? Have we made, or institutionalized, provisions for the requirements of many states which now require refresher courses for professionals who must continue to meet competency and proficiency standards to be relicensed? What are we doing professionally or institutionally about the problems in rural education, migrant education, vocational education? Again, my perspective, very little, and why—because the current funding structure only permits the perpetuation of the same thing. Do we understand that with decreasing enrollments, we will have more and more minority schools? What are the traditionalists in curriculum development doing about it? Is there a role for technology? Yes, but *when* is really the question. *Now* is the answer.

Why is it when I talk to school people at all levels about the place of technology in the school house, they don't perceive it—technology—as part of a solution to the big problem, but they really see it as another problem. Is it a matter of a false sense of priorities? It is, and we are to blame.

We need to reeducate the teachers of teachers. We need to bring the educational institutions closer to the inservice mode. We need togetherness, openness, professional acceptance. We can't continue to be perceived as the problem, but as an integral part of the solution.

In summary, I have attempted to give you reason to question where are we going—is big better? Or, as most of us well agree, small is beautiful. Are we, in our haste to succeed, develop or whatever, getting the cart before the horse? Is what one hears, with increasing frequency, the concern for the growing gap between the information "haves" and the information "have-nots" bothering you? While this concern is expressed most often with reference to the developing Nations of the world, much the same can be said about these United States. There are growing minorities in the lower 48 whose language and skills are not Anglo-Saxon or even western derived. A knowledge and information gap caused by changing socio-economic forces, cultural patterns, emerges every day. A challenge for us, if you believe as I do, that the trends in this country which are moving our society closer and closer toward one of information inequality can be offset by the application of and professional use of technology; and if you believe, then you can. Then I am convinced that one of the least understood social problems of this next decade can be addressed by the policymakers in the right forums using the correct institutional arrangements. The time to start is now!

Videodisc Innovation Projects

**R. Kent Wood and Don C. Smellie,
Center for Instructional Product
Development, Utah State University,
Logan, Utah**

INTRODUCTION

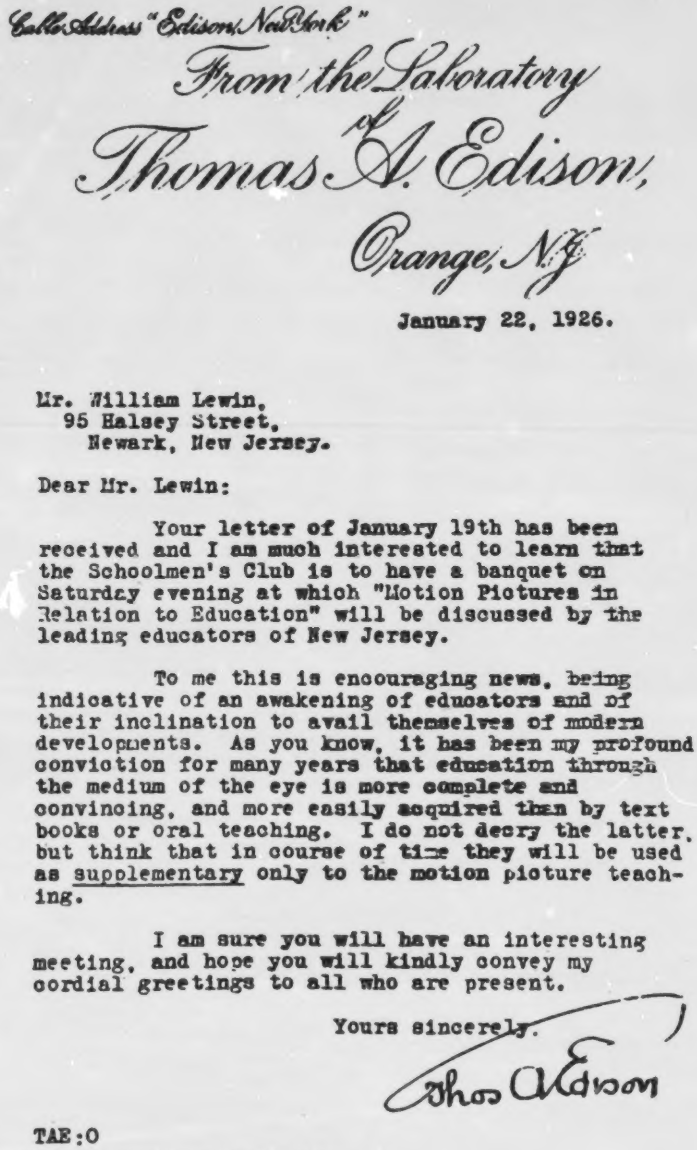
Thomas Edison invented the phonograph in 1877, and by 1927 the Scotsman James Baird had recorded *video* signals on a *disc*. The motion picture was credited to Thomas Edison and his machine was demonstrated before 400 persons at the Department of Physics at the Brooklyn Institute in 1893 (that prototype known as the Kinetograph). Each film contained 700 images which showed on the screen for 1/92 second. The equipment which was to provide the sound accompaniment failed to operate at the Brooklyn presentation. However, by 1926, Edison was receiving many invitations to make presentation/demonstrations and the motion picture was receiving somewhat the attention analogous to the focus on videodisc today. One such invitation was declined with a letter suggesting quote: "As you know, it has been my profound conviction for many years that education through the medium of the eye is more complete and convincing, and more easily acquired than by text books or oral teaching." He went on to explain to that group of educators that he felt motion picture would soon become the major instructional media and textbooks serving a supplementary role (see Figure 1). Videodisc has been a long time in development!

At Utah State University, as we look back in our recent history we find that motion pictures have certainly made major contributions to training in public and higher education, the military, government, business and industry. We do wish to stress the point that it is easy to become enchanted with new media to present a *panacea* or "cure-all mind-set." We are concerned that trainers in military and government, specialists in public and higher education, as well as those concerned persons in business and industrial settings *do not* view videodisc as another *panacea*, but rather in the perspective which it appears to us more fitting, that of a unique medium which will not replace but make other media such as microcomputers, films, books, slides, micro-forms, and audio/video more effective in training and education, as well as improve library and information science applications (see Figure 2).

The USU Videodisc Innovation Projects

The VIP program was inaugurated a century after the invention of the phonograph, in 1977. The Videodisc Innovations Project was funded originally with local funds from Utah State University (from the Provost's Office, the Vice President for Extension and Continuing Education, and the Director of International Programs). From that start of some $20,000, the VIP program is nearing $1,000,000 in funded research and development grants to improve learning in a variety of settings and subject areas. Some of the Videodisc Innovation Projects include the Control Data Corporation funded PLATO/VIDEODISC/AGRIBUSINESS TRAINING SIMULATIONS, the USAEUAR PROJECT (United States Army Education In Europe, jointly with the University of Maryland and On-line Computing, Inc. of Washington, D.C.), the National Science Foundation supported INTELLIGENT VIDEODISC DEMONSTRATION PROJECT (jointly with the University of Utah Physics Department and WICAT), a "State of the Art" research monograph, an edited book of readings on videodisc/microcomputer applications, as well as the FOUNDATIONS OF MEDIA VIDEODISC PROJECT (a videodisc designed to support a graduate course in Instructional Media).

Training and dissemination efforts have included the first National Videodisc/Microcomputer Institute held at Utah State University, June 11–15, 1979. The first NVMI was funded by the U.S. Office of Education Library Training Programs and included invitations to the chief state library and media specialists, or other interested personnel. The second NVMI is planned for August 11–15, 1980 at Utah State University with partial funding now realized, but additional funding is being solicited to focus on educational and training applications. The second NVMI will be with the cooperation of the Minnesota Educational Computing Consortium Videodisc Project personnel, the Nebraska Videodisc Project Personnel, as well as microcomputer specialists from the Northwest Regional Educational Laboratory. VIP program specialists participated with a Northwest Regional Educational Laboratory and the Idaho State Department of Public Instruction in a videodisc/microcomputer workshop in July, 1979, and with the experience of the first NVMI will add to the VIP efforts to help others become more informed and able to implement videodisc/microcomputer systems into instructional and training environments for the improvement of learning.



Cable Address "Edison, New York"

From the Laboratory of Thomas A. Edison, Orange, N.J.

January 22, 1926.

Mr. William Lewin,
95 Halsey Street,
Newark, New Jersey.

Dear Mr. Lewin:

Your letter of January 19th has been received and I am much interested to learn that the Schoolmen's Club is to have a banquet on Saturday evening at which "Motion Pictures in Relation to Education" will be discussed by the leading educators of New Jersey.

To me this is encouraging news, being indicative of an awakening of educators and of their inclination to avail themselves of modern developments. As you know, it has been my profound conviction for many years that education through the medium of the eye is more complete and convincing, and more easily acquired than by text books or oral teaching. I do not decry the latter, but think that in course of time they will be used as supplementary only to the motion picture teaching.

I am sure you will have an interesting meeting, and hope you will kindly convey my cordial greetings to all who are present.

Yours sincerely,

Thos A Edison

TAE:O

Figure 1: Letter From Thomas Edison

DECADE	PANACEA APPROACH 1940's–1960's (solution orientation)	BROAD-BASED APPROACH 1970's and on– (Process orientation)
1940's	16mm FILM	
1950's	LOCAL PRODUCTION EDUCATIONAL TV	
1960's	PROGRAMMED INSTRUCTION	
1970's	I.M.C. CONCEPT (library/media)	INSTRUCTIONAL DEVELOPMENT
1980's	VIDEODISC???	OR VIDEODISC!

Figure 2: Panacea or Broad-Based Process Approach

The VIP programs have been presented to a variety of national conferences. Such presentation/demonstrations have included the Association For Educational Communications and Technology National Convention in New Orleans, Louisiana, where the VIP was unveiled for the first time to the public in March, 1979, with a second program scheduled at the AECT National Convention in Denver, Colorado, April 21–25, 1980. Other presentations have included the American Society For Information Science, the University Council For Educational Administration, the Pacific Instructional Media Association of Western Canada, the Mountain Plains Media Leadership Symposium and a number of state association conventions, workshops and conferences. Presentation/Demonstrations on the VIP in 1980 include the Canadian Library Association National Convention as well as the Canadian Association For Media, Technology and Educational Communications as major training and dissemination efforts, among the several.

The USU Center for Instructional Product Development

The Center For Instructional Product Development (CIPD) is a nonprofit organization, established in 1975 to provide faculty and graduate students of the Instructional Media Department of Utah State University an opportunity to research, develop, and validate instructional products for government, business, education, and industry. The CIPD is an effort to fulfill the traditional role of universities in assisting society at large to resolve problems and to improve the quality of life.

In a relatively short span of time the CIPD has created a number of validated products now in use throughout the United States and Western Europe. The Videodisc Innovation Program is one of the major current efforts of the Center. Others include training modules for Mini-Microcomputer Training for EIMCO Corporation which includes (1) process control; (2) computer control; and (3) computerized process control. Another project with EIMCO is a Water Quality and Pollution training program. A program is under way with Church and Dwight (Arm and Hammer Soda in Green River, Wyoming) to train plant workers to perform job descriptions in the process of bicarbonating and sifting raw materials in the manufacture of baking soda. A Welder Inspector Training Course has been completed for the American Welding Society's Education Department including ten training modules, a 300 page interactive workbook/text and instructor's manual. The AWS modules have received extensive formative/summative evaluation through field tests in four major cities of the United States.

The first videodisc produced for use in higher education in the United States was produced by the Center, and the current Foundations of Media Project involves a complete course being designed using micro-computed videodisc interactive instruction, group instruction, simulations, and project work.

The efforts of the CIPD are being documented in a technical report series which addresses a number of baseline research and development projects generating data to be utilized in the Center's future videodisc/microcomputer efforts. The list of current reports is displayed in Figure 5. These reports are available at a nominal cost to those wishing to obtain copies. Robert Woolley, a member of the VIP research team who will participate in the Demonstration Seminars with this conference (along with Dr. Mike DeBloois, the Director of the Center For Instructional Product Development) will edit this series.

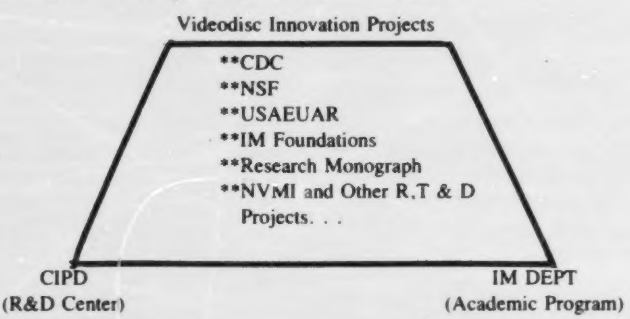


Figure 3: USU Videodisc Innovations Projects With CIPD & IM Department

Optical Videodisc Systems

The optical videodisc has been called the "omnibus medium" because the unique "freeze-frame" capabilities allow very rapid access to the 108,000 frames. Videotape has a similar capacity, but in random direct access tends to wear and is slower in searching time. The 108,000 frames may be increased to 216,000 frames for recording and playing back dynamic motion only, such as a motion picture with continuous velocity rather than selected still frames. To help better conceptualize what the 108,000 frames mean in still frames, it would be similar to a library of 360 books of 300 pages each (360 × 300 = 108,000). With the optical disc systems available and to be demonstrated at this conference these frames may contain the content of a printed page, a chart, slide, of single frame from a motion picture.

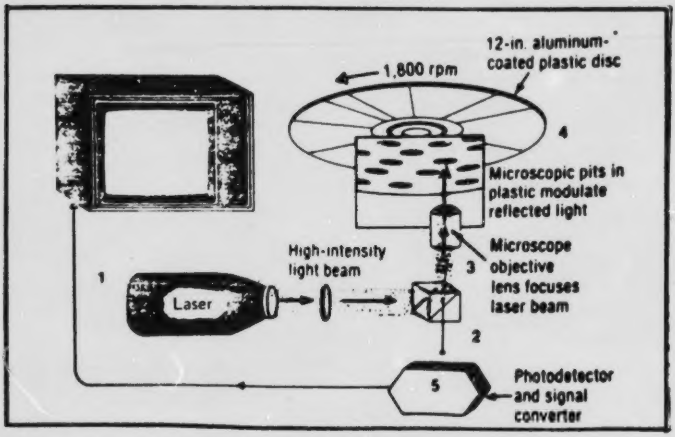

12-in. aluminum-coated plastic disc
1,800 rpm
4
Microscopic pits in plastic modulate reflected light
Microscope objective lens focuses laser beam
3
High-intensity light beam
1
Laser
2
5
Photodetector and signal converter

Figure 4: Optical Laser Reflective Videodisc System

In terms of audio storage and playback, 200 hours of stereo-like music or other sound may be recorded on the single side of a disc. One should be aware that the optical disc may be used to record analog or digitized data which may also be utilized in computing systems. The basic optical videodisc reflective system is displayed in Figure 4.

Other optical videodisc systems include the CRS Thomson videodisc system and the ARDEV (Atlantic Richfield Development Division) which rather than being "reflective" provide for the laser beam to pass through a transparent disc to record and playback. The Thomson disc system also stores 54,000 frames per side and the ARDEV disc is presently being designed to take more advantage of compressed sound (up to two hours of audio combined with fewer frames of information)

REPORT NUMBER	TITLE AND AUTHOR(S)	RELEASE DATE
1	PRELIMINARY BENCHMARK DATA FOR THE PR #7820 DISCOVISION ASSOCIATES VIDEODISC PLAYER, BY ROBERT D. WOOLLEY AND MICHAEL L. DEBLOOIS.	JANUARY 1980
2	PILOT LANGUAGE DOCUMENTATION FOR THE ECC/USAREUR VIDEODISC PROJECTS, BY ROBERT D. WOOLLEY AND JOE WILLIAMS	JANUARY 1980
3	A MODEL FOR DEVELOPING INTERACTIVE MICROCOMPUTER/VIDEODISC INSTRUCTION, BY MICHAEL L. DEBLOOIS AND ROBERT D. WOOLLEY.	FEBRUARY 1980
4	VIDEODISC PREMASTERING AND SCRIPTING PROCEDURES, BY LORNA HARDIN AND BARRY WILLIS.	FEBRUARY 1980
5	COMPUTER INTERFACE DOCUMENTATION FOR THE PR #7820 DISCOVISION ASSOCIATES VIDEODISC PLAYER, BY ROBERT D. WOOLLEY AND JOE WILLIAMS.	MARCH 1980
6	MICROCOMPUTER EVALUATIONS AND TECHNICAL SPECIFICATIONS: A CONSUMERS GUIDE, BY ROBERT D. WOOLLEY, R. KENT WOOD AND J. STEVEN SOULIER.	FEBRUARY 1980
7	STATE OF THE ART OF OPTICAL DISC TECHNOLOGY FOR CONSUMER AND EDUCATIONAL USE, BY R. KENT WOOD AND ROBERT D. WOOLLEY.	JANUARY 1980
8	CRITERIA FOR THE DEVELOPMENT OF AN EDUCATIONAL/INDUSTRIAL VIDEODISC PLAYER, BY ROBERT D. WOOLLEY AND ROD DAYNES.	MARCH 1980

Figure 5: Technical Report Series

and still frame instruction with minimal dynamic motion sequences.

One should be aware that the microscopic pits "burned in" to record data are small (if a human-sized hair were placed over an optical videodisc it would blank out 75 frames of information). The technology is being developed with the "blue laser" applications to increase the present storage capacity. Philips of the Netherlands is developing an industrial/educational videodisc system, and with the recent merger of IBM and MCA/Universal Discovision to form Discovision Associates, several changes will occur to improve optical videodisc systems. Magnavision will also be making improvements in their system which is directed mainly to the home entertainment market. Sony and Sharp Electronics of Japan have announced they will use a compatible reflective optical videodisc system, similar to the present Discovision and Magnavision system, along with five other major electronic firms.

Replication of optical reflective videodisc systems will be done soon by such firms as Minnesota Mining and Manufacturing, Inc., and is presently being done by Sony Corporation. Other firms to watch include Energy Absorption, Inc. of California, a firm which is experimenting with photo replication processes of videodiscs to be compatible with the Magnavision and Discovision systems.

CONCLUSION

The presentation/demonstration of the Videodisc Innovation Projects has been brief but hopefully informative in a non-technical sense. We wish to stress that videodisc/microcomputer technologies are not a panacea, but an exciting new combined media which holds great potential for applications in government, industry, military, and education. In closing let us paraphase with literary license, a saying:

> "For forms of [MEDIA] . . . let fools contest; Whate'er is best administered is best!"
>
> Alexander Pope, Essay on Man, 1733

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EDUNET: A National Network for Computing in Education and Research

Paul S. Heller, Executive Director, EDUNET/EDUCOM, Princeton, New Jersey

INTRODUCTION

EDUNET is a national network of colleges and universities that makes possible the sharing of computer-based resources in higher education and research. By arranging for the supply of computing materials from some of the finest university computer centers in the United States, and by providing the services that allow remote users on other campuses to identify, access, and apply these resources, EDUNET substantially increases the computing options available to participating members of the academic and research community.

EDUNET does not own or operate a computer. It does provide the marketplace and organizational framework that permit colleges, universities, and other research and teaching institutions to exchange many desirable and often unique resources previously known only to a small, local group of users. EDUNET makes these resources widely known and takes advantage of rapidly advancing technology to bring the resources within the easy and inexpensive reach of users from coast to coast and in many other countries as well.

As a membership organization, EDUNET offers its institutional participants access to a vast selection of computer-assisted instructional materials, extensive data bases, and advanced research software. For EDUNET suppliers, the network also provides a national distribution outlet for their many large, unusual, and specialized resources.

Connecting Links

Potential users often find out about EDUNET suppliers and their computer-based materials as a result of the information services offered by the central staff in Princeton, New Jersey. Working through this one coordinating entity, users can reach liaisons at member schools and other experts throughout the EDUNET system to obtain informed consultation and guidance.

While EDUNET makes the human connections, it looks to the data communication services offered by "value-added" (or "packet switched") networks, such as Telenet and TYMNET, for the electronic connections between EDUNET users and suppliers. These services offer users ease of access, excellent terminal support, and reasonable rates. Typical communications costs for EDUNET users range between four and six dollars an hour. This compares to the approximately twenty dollar per hour charges incurred from direct long-distance dialing.

Since virtually all of the EDUNET suppliers have dedicated host connections to at least one of the data communications networks, users can instead dial a local number in any of 170 United States locations, insert the phone into the terminal coupler, and enter a simple command on the terminal keyboard. This will connect the user's terminal to the desired host. The user then proceeds to log-on as if the computer were on his own campus.

EDUNET Suppliers

- Carnegie-Mellon University
- Cornell University
- Dartmouth College
- University of Delaware
- University of Georgia
- University of Illinois
- Massachusetts Institute of Technology
- University of Minnesota
- NJIT
- State University of New York at Albany
- University of North Carolina
- University of Notre Dame
- Rice University
- Stanford University
- University of Wisconsin
- Yale University

Network Supplies

Currently, the suppliers of EDUNET products are sixteen dfferent colleges and universities. These schools tend to be larger institutions, with significant instructional and research computing capabilities, and their computing centers house some of today's most advanced technology. Users may choose among six IBM 370's, an IBM 3033, four DEC systems, four large CDC machines, two Honeywell systems, two UNIVAC 1110's, one Amdahl, one HP, one Burroughs and one of the newest Itel computers. The operating systems driving these machines are equally diverse. The list includes the sophisticated Multics facility and the flexible virtual memory environment provided under VM.

Resources available from EDUNET suppliers are applicable to instruction and research in virtually all college disciplines, and they are suitable for meeting many other campus computing needs. Types of resources actively supported for remote use include:

- Computer-assisted instructional materials (CAI)
- CAI authoring languages
- Statistical packages
- Subroutine libraries
- Planning and analysis models
- Simulation languages and games
- Extensive data bases
- Data base management systems
- Information storage and retrieval systems
- Programs for textual analysis
- Graphics software
- Text editors
- Electronic mail facilities
- Conferencing systems

Network Users

Since the first EDUNET account was assigned in the fall of 1977, the steadily widening variety of network applications has ranged from a computer science class in Oregon accessing an EDUNET supplier to gain experience with IBM equipment, to a psychology professor in the northeast accessing several hosts to test different statistical algorithms. Between computer science and psychology, EDUNET provides computing aids for such disciplines as anthropology, chemistry, English, political science, law, and several foreign languages.

EDUNET users come from an assortment of academic settings. They include individual faculty members at small community colleges and administrative teams from the most well-endowed private universities. User locations extend from the corner of Washington state through Kentucky and Noth Carolina to western Massachusetts and even across United States borders to England and Canada. User institutions also vary in orientation, encompassing technical colleges, liberal arts colleges, research-intensive graduate schools, nonprofit research organizations, and schools of law and medicine.

Examples of successful EDUNET applications include:

- A philosophy professor at a university in Pennsylvania applying Dartmouth's logic programs in his own educational research

- A private college in New York City exposing its faculty to statistical packages and computer-assisted instructional (CAI) materials at three different suppliers as part of the federally-funded Advanced Institutional Development Program
- Two schools of library science and education in North Carolina using WISE at the University of Wisconsin to train students in bibliographic search and retrieval techniques
- Administrators at more than thirty colleges and universities using EFPM, a financial planning and modeling system at Cornell

Information Services

As an information clearinghouse, EDUNET helps users at member schools learn what network opportunities exist and how they can best be pursued. The network staff arranges convenient channels for communication, distributes informational materials, and provides forums for effective information exchange.

EDUNET HOTLINE. For general inquiries

EDUNET NEWS. Keeps individuals at member institutions and other interested readers informed of the most current network happenings.

EDUNET Data Base. An on-line catalog of suppliers and hundreds of their computing resources. With on-campus terminals, users can browse the data base to locate resources suited to their needs.

User Support Services

Since EDUNET is new to many of its participants and since users are often thousands of miles away from the supplier they are accessing, it is essential that a first echelon of user support service be readily available. Relying on staff skills and a large reference library, EDUNET Central helps its users understand how the system works, how to get to the desired supplier computer, and how to apply the most appropriate resource for their needs.

Data Communications. In this area of rapid technological change, the EDUNET staff provides guidance and advice in determining the most cost-effective data communications alternatives for EDUNET users.

Terminal Procedures. Because of the variety of terminals used to access EDUNET suppliers and the different technical procedures involved at the supplier sites themselves, users are assisted by published log-on procedures disseminated by EDUNET Central and specific instructions for using desired resources.

Sample Sessions. For many resources, sample sessions have been developed showing typical user-computer interactions and associated cost figures.

Member's Guide. Each EDUNET member institution will receive an extensive notebook containing all the information necessary to make effective use of the EDUNET system. The volume includes operational aides as well as detailed information on EDUNET suppliers and resources.

Administrative Services

Both user and supplier institutions benefit by placing responsibility for network administrative functions in the Princeton central office. Users profit by knowing that there is one place to go for operational support; suppliers reap the benefits of having an extended staff to perform many of the activities they would otherwise have to perform themselves.

Account Initiation. Since EDUNET has agreed upon accounting procedures with each supplier, opening accounts can usually be accomplished with a phone call to EDUNET Central. Prompt initiation of accounts is convenient for users, permitting immediate computing and eliminating the bureaucratic frustrations normally experienced when arranging to access a remote computer.

Central Billing. As a financial clearinghouse, EDUNET provides one point of contact for billing and accounting. Regardless of the number of suppliers accessed, users will receive a single, consolidated monthly bill for services obtained through EDUNET.

Document Ordering. EDUNET has also implemented administrative procedures that make it easy for users to obtain needed documents. Orders can be placed directly with EDUNET Central, using EDUMAIL or the EDUNET Hotline.

Software Placement. When interesting and unusual computer resources are produced at non-supplier member institutions, the staff will work with the developers to find and make arrangements with suppliers that will offer the software on their systems.

SUMMARY

By coordinating the information, administrative, and user support services normally duplicated by many institutions, an educational network streamlines resource exchange among colleges, universities, and other research organizations. By arranging for the supply of resources that are too large, complex, specialized, or expensive for most centers to install and maintain, an educational network satisfies many computing needs while allowing for reasonable rates, reduced personnel and software development costs, and computer expenditure control. By providing for the connection of any computer terminal to prominent academic computer centers across the country, an educational network permits immediate access to a vast selection of computing resources. It is our goal to enrich the computing environment in higher education and research and enhance the flexibility and independence of participating institutions.

LARC: Access for Multi Media

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What is a LARC? It's a Learning Activities Resource Center. It is a concept, a sensitive place where people can learn alone, can learn in a group. A learner can discover an answer, can receive human help in finding an answer, can find other people's answers throughout time. It is a physical place with books, carrels, rooms, film, tapes, terminals, discs, objects. It is a supporting cluster of professionals helping students, be they young or mature, be they enrolled or employed, be they questioner or answerer. It is a place where search for truth is the single goal. It takes many forms—human, machine, man-machine systems. It is available 90 hours a week. The search for truth as a way of being. LARC is a concept where that search is heard, read, seen and represents the major thrust of becoming.

With that statement California State University, Chico, one of 19 campuses in a system of higher education, carved out its sphere of influence. LARC began like a phoenix, from the traditional service which was under fire from the users; faculty, students, staff and the region we represent. Users on our campus were concerned with access to materials, unmet instructional needs, hassles in service, and the tremendous potential which could be provided in a proposed new building scheduled to include the library, the media center and a teaching department of some 8 faculty and 90 students in mass communications. A Task Force, appointed by the President on the recommendation of the Vice President for Academic Affairs and the Chair of the Faculty Senate, worked for about a year. Membership included personnel from the library, the media center, the teaching department, a learning theorist, faculty from heavily library dependent schools, information specialists from computer science, and a representative from the money-budget area. The Chair was a very highly respected Dean with a strong ability in group dynamics. Communication with the administration was regular and thorough. In fact, the charge to the group was formed by the Vice President for Academic Affairs and directed their attention toward an integrated instructional support program including library, media, and computer operations. The results, he warned, would, upon adoption, form the support program and its budget at least until 1985.

The Task Force went to work and when the report was finalized it was adopted by the Faculty Senate and the University. The recommendations, 6 in number, represented an integrated support system, require compatability of parts of systems, insist that on campus and off campus instructional support be designed and developed as a whole, and lend administrative support to faculty interested in software development. (Figures 2 and 3.) The report became, as presented, a section of the University Master Plan. (Figure 1.) The role of Dean was created almost simultaneously.

The Dean role was not from one of the units to be integrated. It was specifically designed to be a person from the faculty who had credibility in the faculty, enough experience with systems to predict success, and tenacity. The first Dean's background included the additional potential of being female. Given an already designed building albeit still under construction, given a faculty and staff which was fairly stable, given attitudes of doubt, fear, and downright antagonism because "THEY" are doing it to us, the campus implementation began.

There were principles of agreement in experience, background, and philosophy. One of the most commonly held was that people can change but they need support and assistance. Another was the principle of critical mass. When a group is augmented by a new member that new member adds to the probability of the group moving. Given enough augmentation the group will have moved. Another principle was the "hidden committee" concept, that members of a group bear with them values and attitudes which are not apparent, values and attitudes from sources of which the group is not even aware. Environmental change, listening, accessibility to the decision makers, intrusion of group treatment were all considerations. All were used. The delicacy of predicting, following up and designing were involved. The faculty "panacea" seekers, the rigid traditionalists, the "show me," were available to comment. And they did. What was unique was that the faculty was predicted, followed up, made responsible for their contributions, and involved. We probably used a veritable forest of paper. We did use all communications devices known. Primarily we kept the administration, the Task Force members, and the Faculty Senate aware, insisted they lead by becoming actively involved users, and planned. We planned and planned and planned. We used standard systems analysis for three parts: people, equipment, program. Always we planned from the point of view of the *user*. For the remainder of this paper the before and after will be described in terms of where we were, where we are now, and, finally how we moved. At the end of that part we'll describe where we hope to be in 1990.

IN JUNE, 1972, THE PRESIDENT ISSUED EXECUTIVE MEMORANDUM 72-71, THE UNIVERSITY MASTER PLAN. IN THIS DOCUMENT A SET OF COMPREHENSIVE "GOALS OF CHICO STATE COLLGE" WERE STATED AS FOLLOWS:

"I. TO PROVIDE FOR ALL OF ITS STUDENTS AN EDUCATION OF HIGH ACADEMIC QUALITY WHICH WILL BE OF VALUE TO THEM NOW AND IN THE FUTURE;

II. TO INSURE THAT THE ENVIRONMENTS OF THE INSTITUTION, EDUCATION, HUMAN AND PHYSICAL ARE THOSE:
  A. MOST CONDUCIVE TO THE INTELLECTUAL, CULTURAL AND PERSONAL DEVELOPMENT OF ITS STUDENTS;
  B. MOST IN KEEPING WITH THE DISTINCTIVENESS AND TRADITIONS OF THE COLLEGE;

III. TO PROVIDE A BALANCED, TOP QUALITY UNDERGRADUATE EDUCATION WHICH WILL HELP IN THE DEVELOPMENT OF HUMANE, INTELLECTUAL, AND AESTHETIC VALUES AND PROFESSIONAL GOALS AMONG THE STUDENTS WHO ATTEND THE INSTITUTION.

IV. TO PROVIDE QUALITY GRADUATE EDUCATION IN SELECTED FIELDS OF STUDY IN WHICH NEEDS OF SOCIETY AND STUDENTS CAN BE MET WITHIN THE LIMITATIONS OF THE COLLEGES' RESOURCES."

(THERE IS A PROPOSED DOCUMENT WHICH IS TO BE DISCUSSED (AND THUS CAN BE CHANGED) WHICH PROPOSES THESE RE-STATEMENTS OF THOSE GOALS.

I. TO PROVIDE EDUCATION OF HIGH QUALITY;

II. TO PROVIDE FOR ALL OF ITS STUDENTS AN EDUCATION WHICH WILL BE OF VALUE TO THEM NOW AND IN THE FUTURE;

III. TO ENSURE THAT THE EDUCATIONAL, HUMAN, AND PHYSICAL ENVIRONMENTS OF THE UNIVERSITY ENHANCE STUDENT DEVELOPMENT, SUPPORT SCHOLARLY ENDEAVOR, AND ARE IN KEEPING WITH THE DISTINCTIVENESS AND TRADITIONS OF THE INSTITUTION;

IV. TO ENCOURAGE THE INVOLVEMENT OF THE EDUCATIONAL RESOURCES OF THE UNIVERSITY IN THE DEVELOPMENT OF THE ECONOMIC, CULTURAL, SOCIAL, AND EDUCATIONAL POTENTIALS AND CIVIC RESPONSIBILITIES OF THE UNIVERSITY'S SERVICE REGION.)

IN THE ACADEMIC MASTER PLAN WAS INCLUDED THE FINAL RECOMMENDATION OF THE TASK FORCE ON INSTRUCTIONAL MEDIA WHICH REPORTED IN SECTION IV, C-4:

> "INNOVATION AND INSTRUCTION, LEARNING MODES AND CAMPUS ACTIVITIES SHALL BE ENCOURAGED THROUGH THE ESTABLISHMENT OF A FACULTY RESOURCES CENTER TO INCLUDE ASSISTANCE AND EVALUATION OF CLASSROOM TEACHING BEHAVIOR, ASSESSING LEARNING AND PROVIDING RESOURCES FOR DEVELOPMENT OF MORE EFFECTIVE TEACHING MODES, AND INCORPORATING MODERN INSTRUCTIONAL MEDIA IN THEIR PROGRAMS. LEARNING RESOURCES. E.G., MEDIA CENTER, LIBRARY, COMPUTER SYSTEM, COMMON DISTRIBUTION SYSTEMS FOR RESOURCES BOTH ON AND OFF CAMPUS, ETC., SHOULD BE COORDINATED SO THAT THEY BECOME A FUNCTIONING, INTEGRATED SYSTEM."

Figure 1: Master Plan Statement

OCTOBER 26, 1978

TOWARD MEETING THESE PRINCIPLES THE MISSION OF THE LEARNING ACTIVITIES RESOURCE CENTER IS DEFINED:

MISSION

THE MISSION OF THE LEARNING ACTIVITIES RESOURCE CENTER IS TO PROVIDE SUPPORT FOR THE UNDERGRADUATE AND GRADUATE PROGRAMS OF THE UNIVERSITY ON CAMPUS AND THROUGHOUT ITS SERVICE AREA, TO SERVE AS A CAMPUS CENTER FOR REGIONAL INFORMATION WITHIN RESOURCE AVAILABILITY AND COOPERATIVE AGREEMENTS, AND TO SUPPORT THE CULTURAL ENRICHMENT OF THE UNIVERSITY AND NORTHEAST CALIFORNIA COMMUNITIES. THE LEARNING ACTIVITIES RESOURCE CENTER WILL PROVIDE INFORMATION AND LEARNING RESOURCE SERVICES TO SUPPORT STUDENT LEARNING, INSTRUCTIONAL ACTIVITY AND ENRICH THE QUALITY OF LIFE.

PURPOSE

THE PURPOSE OF THE LEARNING ACTIVITIES RESOURCE CENTER IS TO OBTAIN, PRODUCE, STORE, PROVIDE ACCESS TO AND DISSEMINATE INFORMATION IN ALL FORMATS WHICH WILL SUPPORT INSTRUCTION AND WILL ENRICH THE QUALITY OF LIFE FOR THE UNIVERSITY COMMUNITY AND SERVICE AREA.

LARC GOALS

IN ORDER TO SUPPORT THE GENERAL GOALS OF THE UNIVRSITY, APPROACH THE MISSION OF LARC AND ACHIEVE OUR PURPOSES, WE ESTABLISH THE FOLLOWING GOALS:

1. ORGANIZE AND PROVIDE INFORMATION FOR STUDENTS, FACULTY AND STAFF FOR SUPPORT OF A FORMAL CURRICULUM DEDICATED TO AN EDUCATION OF HIGH QUALITY;
2. ORGANIZE AND PROVIDE INFORMATION WHICH WILL AID FACULTY, STAFF AND STUDENTS IN SELF-DIRECTED PERSONAL GROWTH;
3. PROVIDE ASSISTANCE AND INSTRUCTION IN THE EFFICIENT USE OF LEARNING AND INFORMATIONAL RESOURCES INCLUDING LABORATORY SUPPORT FOR PROGRAMS DEPENDENT UPON PROCESSING OR PRODUCTION;
4. PROVIDE AN ENVIRONMENT WHICH WILL STIMULATE SCHOLARLY ENDEAVOR AND PERSONAL DEVELOPMENT;
5. PROVIDE IN SUPPORT OF UNIVERSITY EXTERNAL PROGRAMS MATERIALS AND SERVICES TO STUDENTS AND FACULTY INVOLVED IN OFF-CAMPUS UNIVERSITY ACTIVITIES; AND
6. MAKE ITS RESOURCES AND SERVICES AVAILABLE TO RESIDENTS AND INSTITUTIONS OF THE AREA THROUGH COOPERATIVE AGREEMENTS IN SUPPORT OF THE INVOLVEMENT OF THE UNIVERSITY IN THE SOCIAL, CULTURAL, ECONOMIC AND EDUCATIONAL DEVELOPMENT OF ITS SERVICE AREA.

Figure 2: LARC Mission

GOAL 1: ORGANIZE AND PROVIDE INFORMATION FOR STUDENTS, FACULTY AND STAFF FOR SUPPORT OF A FORMAL CURRICULUM DEDICATED TO AN EDUCATION OF HIGH QUALITY.

1.1 ORDER AND PROCESS ON A CURRENT BASIS ALL THE FORMATS OF INFORMATION REQUIRED.

1.2 CREATE A COMMON FORMAT, MACHINE READABLE BIBLIOGRAPHIC RECORD REPRESENTING ALL HOLDINGS OF LARC FOR EASE OF PATRON ACCESS.

1.3 WORK COOPERATIVELY WITH THE TEACHING FACULTY TO DEVELOP A COLLECTION OF HIGHEST QUALITY, ACQUIRED OR PRODUCED, ACCORDING TO BEST POSSIBLE SOURCES AND TECHNIQUES TO MEET THE NEEDS OF EACH ACADEMIC DISCIPLINE.

1.4 PROVIDE BEST POSSIBLE INFORMATION AND REFERENCE SERVICES TO ASSIST STUDENTS, FACULTY AND STAFF TO OBTAIN THE MATERIALS THEY NEED TO FULFILL THEIR EDUCATIONAL OBJECTIVES.

1.5 IMPROVE THE ABILITY TO DISSEMINATE MATERIALS.

1.6 AUGMENT THE COLLECTION BY BORROWING, PURCHASE OR RENTAL OF MATERIALS AND DATA SOURCES.

1.7 INCREASE THE AMOUNT OF AVAILABLE COMPUTER CAPACITY AND CAPABILITY.

1.8 ANALYZE COMPUTING NEEDS FOR INSTRUCTIONAL AND ADMINISTRATIVE USES OF THE UNIVERSITY AND ACQUIRE FACILITIES, PROGRAMS AND DATA TO PLAN AND IMPLEMENT METHODS OF MEETING THOSE NEEDS.

1.9 ANALYZE THE COMMUNICATION NEEDS FOR INSTRUCTION AND ADMINISTRATIVE USES OF THE UNIVERSITY AND ACQUIRE FACILITIES TO PLAN, IMPLEMENT AND AUTHORIZE METHODS TO MEET THOSE NEEDS.

1.10 EVALUATE THE CURRENT METHODS OF PROVIDING ACCESS TO INFORMATION.

GOAL 2: ORGANIZE AND PROVIDE INFORMATION WHICH WILL AID FACULTY, STAFF AND STUDENTS IN THEIR SELF DIRECTED PERSONAL GROWTH.

2.1 IDENTIFY, OBTAIN OR DEVELOP MATERIALS WHICH HELP TO MEET CIVIC, RECREATIONAL, VOCATIONAL AND AVOCATIONAL NEEDS OF FACULTY, STAFF, AND STUDENTS WITHIN THE RESOURCE AVAILABILITY.

2.2 IDENTIFY TOPICS OF MUTUAL INTEREST WITH OTHER AGENCIES WHERE LARC COULD SERVE AS A CO-SPONSOR BY PROVIDING PERSONNEL, SPACE, FACILITIES/SYSTEMS OR ADDITIONAL ENRICHMENT MATERIAl.

2.3 PROVIDE SPACE SUPPORT FOR THE STUDENT LEARNING ASSISTANCE CENTER.

Figure 3: LARC Goals

GOAL 3: PROVIDE ASSISTANCE AND INSTRUCTION IN THE EFFICIENT USE OF LEARNING AND INFORMATIONAL RESOURCES INCLUDING LABORATORY SUPPORT FOR PROGRAMS DEPENDENT UPON PROCESSING OR

3.1 EVALUATE THE CURRENT ORIENTATION PROGRAMS AND SUPPLEMENT THEM BY PURCHASE OR PRODUCTION OF APPROPRIATE MATERIALS TO PROVIDE FAILIARIZATION WITH RESOURCES.

3.2 PROVIDE OPPORTUNITIES FOR GROUPS AND INDIVIDUALS TO RECEIVE INSTRUCTION AND CONSULTANT SERVICES LEADING TO IMPROVED USE OF LARC CAPABILITIES.

3.3 OTHER SERVICES AND MATERIALS THAT SUPPORT INDEPENDENT STUDY OR RESEARCH BY STUDENTS, FACULTY AND OTHER PATRONS.

3.4 DEVELOP THE PROCESS WHICH ENCOURAGES THE CAMPUS COMMUNITY TO USE LARC CAPABILITIES.

3.5 IMPROVE DIRECTED AND SELF INSTRUCTIONAL TRAINING IN THE USE OF INFORMATION ACCESS TOOLS AND RESOURCES.

3.6 PROVIDE APPROPRIATE INFORMATION AND INSTRUCTIONAL DESIGN SUPPORT FOR DEVELOPMENT OF COURSES AND TEACHING TECHNIQUES.

3.7 ENGAGE IN CONTINUING DIALOG WITH THE UNIVERSITY COMMUNITY TO IMPROVE METHODS FOR SERVING ITS EDUCATIONAL AND CULTURAL NEEDS.

3.8 EVALUATE THE ACHIEVEMENT, CORRECTION AND EFFECTIVENESS OF GOAL 3.

3.9 MAINTAIN THE STRENGTH OF USER ASSISTANCE AND INTERPRETATION OF RESOURCES ON A CONTINUING BASIS.

GOAL 4: PROVIDE AN ENVIRONMENT WHICH WILL STIMULATE SCHOLARLY ENDEAVOR AND PERSONAL DEVELOPMENT.

4.1 CREATE AN ATMOSPHERE OF GOOD SERVICE BY FOSTERING A HIGH STAFF MORALE.

4.2 INSURE THAT THE CONDITIONING, VISUAL PREPARATION AND INTERNAL DISTRIBUTION OF SPACE WILL FILL, FUNCTIONALLY AND AESTHETICALLY, THE NEED FOR A BALANCED EDUCATIONAL AND HUMAN ENVIRONMENT.

4.3 GIVE PRIORITY TO THE HUMAN FACTORS IN MAN-MACHINE RELATIONSHIPS.

Figure 3: (cont.)

GOAL 5: PROVIDE IN SUPPORT OF UNIVERSITY EXTERNAL PROGRAMS MATERIALS AND SERVICES TO STUDENTS AND FACULTY INVOLVED IN OFF-CAMPUS UNIVERSITY ACTIVITIES.

5.1 PRODUCE COURSES FOR EXTERNAL PROGRAMS EACH SEMESTER AND DELIVER VIA THE INSTRUCTIONAL TELEVISION FIXED SERVICE (ITFS) SYSTEM TO OFF-CAMPUS LEARNING CENTERS.

5.2 PROVIDE RELIABLE 2-WAY COMMUNICATION SYSTEMS TO ENABLE STUDENTS AT OFF-CAMPUS LEARNING CENTERS TO INTERACT WITH FACULTY IN A VARIETY OF MODES.

5.3 PROVIDE COMPUTER TERMINAL SERVICES AND ACCESS AT THE OFF-CAMPUS LEARNING CENTERS.

5.4 PRODUCE COURSES FOR RADIO BROADCAST.

5.5 ENHANCE APPROPRIATE REFERENCE, CIRCULATION AND BIBLIOGRAPHIC SERVICE AS REQUIRED TO OFF-CAMPUS STUDENTS.

5.6 PROVIDE PARALLEL RESOURCES AND EQUIPMENT TO OFF-CAMPUS LEARNING CENTERS AS REQUIRED FOR USE BY STUDENTS AND INSTRUCTORS.

5.7 PROVIDE CONTINUING TRAINING AND CONSULTATION TO OFF-CAMPUS LEARNING FACILITATORS REGARDING USE OF LARC CAPABILITIES.

5.8 AS TECHNOLOGY ADVANCES, EXPLORE ALTERNATIVE MODES OF DELIVERY FOR IMPROVEMENT OF INSTRUCTION.

GOAL 6: MAKE ITS RESOURCES AND SERVICES AVAILABLE TO RESIDENTS AND INSTITUTIONS OF THE AREA THROUGH COOPERATIVE AGREEMENT IN SUPPORT OF THE INVOLVEMENT OF THE UNIVERSITY IN THE SOCIAL, CULTURAL, ECONOMIC AND EDUCATIONAL DEVELOPMENT OF ITS SERVICE AREA.

6.1 PROVIDE RESOURCES TO PERSONS WITH THE OPPORTUNITY TO UTILIZE IFTS, RADIO OR TV TO SHARE VIEWS AND KNOWLEDGE.

6.2 PROVIDE BY PURCHASE OR PRODUCTION SPECIAL PROGRAMS IN THE PUBLIC INTEREST FOR DELIVERY TO RESIDENTS IN NORTHEASTERN CALIFORNIA VIA TELEVISION AND RADIO.

6.3 PROVIDE INTERLIBRARY LOAN SERVICES.

6.4 COLLECT MATERIALS AND DISSEMINATE INFORMATION PERTAINING TO NORTHEAST CALIFORNIA INTERESTS.

Figure 3: (cont.)

GOAL 6: (continued)

6.5 PROVIDE LEADERSHIP IN ESTABLISHING COOPERATIVE AGREEMENTS WITH:

1) PUBLIC TELEVISION;

2) CABLE TELEVISION COMPANIES;

3) COUNTY SUPERINTENDENTS OF INSTRUCTION AND SCHOOL DISTRICTS;

4) NORTH STATE COOPERATIVE LIBRARY SYSTEMS;

5) LEARNING CENTERS AND LIBRARIES OF U.C.-DAVIS AND THE SIX COMMUNITY COLLEGES IN NORTHEASTERN CALIFORNIA; AND

6) LOCAL HISTORICAL SOCIETIES, ORGANIZATIONS AND PUBLIC AGENCIES.

6.6 ASSIST IN DEFINING THE MARKETING AND PUBLIC RELATIONS REQUIREMENTS TO BE EFFECTED BY THE UNIVERSITY IN SUPPORT OF THESE SERVICES.

IN ORDER TO ACHIEVE THESE LARC GOALS, THE ADMINISTRATION OF LARC WILL:

1.0 IN MATTERS INTERNAL TO THE ADMINISTRATIVE OFFICE:

1.1 DEFINE THE SCOPE OF EACH AREA OF RESPONSIBILITY TO MAINTAIN CURRENCY, EFFICIENCY AND COST EFFECTIVENESS.
1.2 EVALUATE ROUTINE PROCEDURES, AND SEEK INNOVATION AND CHANGE FOR MORE EFFICIENT FLOW WITH PARTICULAR EMPHASIS ON AUTOMATION.
1.3 MAINTAIN FLEXIBILITY IN STAFFING TO ASSURE THE MOST EFFICIENT USE OF STAFF TIME IN RESPONSE TO FLUCTUATING WORK LOAD.
1.4 DEFINE AND EVALUATE THE GENERATION, STORAGE INPUT AND USE OF MANAGEMENT INFORMATION.
1.5 PROVIDE A SUPPORTIVE ENVIRONMENT IN ALL RELATIONSHIPS AS A MODEL OF ETHICAL BEHAVIOR.
1.6 IMPROVE INTERNAL COMMUNICATION.
1.7 EVALUATE EMPLOYEE SATISFACTION/DISSATISFACTION WITH ACTIVITIES.

Figure 3: (cont.)

2.0 IN MATTERS INTERNAL TO LARC:

2.1 ENCOURAGE ALL STAFF MEMBERS TO MAKE CONTRIBUTIONS INTO THE DECISION-MAKING PROCESS.
2.2 PROVIDE THE BEST POSSIBLE PHYSICAL AND PSYCHOLOGICAL ENVIRONMENT.
2.3 ESTABLISH A PATTERN OF STAFF DEVELOPMENT WHICH WILL PROVIDE ALL PERSONNEL WITH OPPORTUNITIES TO BROADEN THEIR PERSPECTIVES (AS EMPLOYERS, PERSONS AND MEMBERS OF A UNIVERSITY COMMUNITY) WHICH WILL EFFECT THE BEST PRACTICE.
2.4 IMPROVE COMMUNICATION WITHIN LARC.
2.5 DEVELOP A MECHANISM FOR SYSTEMATIC OBJECTIVE EVALUATION OF THE LARC PROGRAM INCLUDING INTEGRATION EFFORTS.

3.0 IN MATTERS EXTERNAL TO LARC:

3.1 WORK WITH THE FACULTY, FACULTY SENATE, STUDENTS AND UNIVERSITY ADMINISTRATION THROUGH GROUPS SUCH AS THE LEARNING RESOURCES COMMITTEE AND THE COMPUTER CENTER ADVISORY BOARD TO INTERPRET LARC CONCERNS TO THE CAMPUS AS WELL AS TO RECEIVE AND RESPOND TO RECOMMENDATIONS AND INQUIRIES FROM THE CAMPUS
3.2 PROVIDE MANAGEMENT INFORMATION, COMMUNICATION FOCUS AND GUIDANCE TO AND FROM THE CHANCELLOR'S OFFICE, E.G., LEARNING SERVICES DEVELOPMENT, THE DIVISION OF INFORMATION SYSTEMS AND OTHER GOVERNMENTAL CONTROL AGENCIES.
3.3 CONTINUOUSLY INTERPRET BEST OPERATIONAL PRACTICE TO THE UNIVERSITY COMMUNITY.
3.4 INTERPRET PLANNING GOALS AND GAIN SUPPORT FROM THE CAMPUS AND THE SYSTEM.
3.5 DEVELOP INFORMATION ABOUT AND POLITICAL SUPPORT FOR LARC AND ITS GOALS.

Figure 3: (cont.)

Where We Were

The Library has a print collection traditionally associated with an academic environment. Professional librarians, appropriate paraprofessionals and clerical personnel assisted those who came to the building. We had a Library Committee to assist the Director in the development of the collection, a collection to support instruction. Funding was provided on criteria established in State law. The Librarian had two guiding forces: the System which provided regular meetings of the equivalent Librarian Directors all over the State; and the Vice President for Academic Affairs. The Director position was paid at an Academic Dean level.

The Media Center was in two parts: audio visual and television. Audio visual was housed in a World War II barracks building with one graphic artist and a small collection of equipment and an even smaller collecton of films. Television was housed in a refurbished warehouse that had been used for storage of nuts, a major product of our area. Television had been on the second floor of the Administration Building in a refurbished pair of classrooms. Both were separately funded, as a line item in the budget, to deliver service. Television was funded with three positions (director, secretary, technician) to provide service. A relatively new Director of Media had just been appointed and his first goal was to bring the services together. The collection of films, purchased by departmental funds, was pulled out of desk drawers and filing cabinets and made a University collection. The Senate, furthermore, insisted that funds be made available to keep the collection in good shape with replacement footage and total film replacement when indicated. Television Services, on request, recorded off the air for classroom use.

The Computer Center offered four systems for administrative and instructional support: campus timeshare and batch; and System timeshare and batch. The heaviest campus use was in support of the computer science, business, and psychology programs. Occasionally faculty users surfaced in other programs, and the number started to increase with youngerfaculty being employed using the systems for research and graduate classes. The programs were essentially two types: centrally System supported and locally created programs. Service was available 24 hours a day, 7 days a week, 12 months a year. Direction for the Center was carefully given from the Division of Information Systems working with the Department of Finance. Why? Because computing is expensive, could be misused, and needed coordination for best use. In fact, because of the incredible leadership of the Chair of the Computer Science Department, the careful planning of Finance, Information Systems, and the naive state of the campus, coordination and planning were the hallmarks, almost untroubled by the few users.

The Mass Communications Department was in disarray. It had a radio station assigned to it on behalf of the University Foundation, an FM station, KCHO, which was to carry University courses (both credit and non-credit), broadcast cultural events, and provide a laboratory place for students to practice. The second area of study was journalism which had no newspaper. Students were writing and the first sharing of their work was in *Orville's Wallpaper*, a blueprint newspaper which was fastened to the wall in each of the buildings. Students really got their experience in either an internship in commercial applications or on the campus Associated Students' paper, the *Wildcat*. Fierce arguments ensued over the "directing" of students for credit in opposition to the student newspaper's rights to total freedom.

That was what was: separate groups doing their thing; separate reporting lines for whatever amount of accountability was appropriate; faculty offering services without asking the question of user needs. The assumption that one had to be already in the inner circle in order to participipte was firmly entrenched.

Into the fray came the Task Force

Into the fray, next, came the directive: integrate, systemize.

We were off!

Where We Are Now

Looking back seven years is a startling experience. One could get vain unless one remembers that society had changed, students have changed, the nature of message design has changed, the building which houses us has changed, the critical grants came on time, the administration supported when they could have declined, and the critical mass in personnel is nearly reached.

Today we are much closer to a real LARC than we were.

Organizationally we have departments: a Library including systems and technical services, as well as public services, Instructional Media Center production and distribution, computing, and a teaching department called CICS, the Center for Information and Communications Studies (Figure 4).

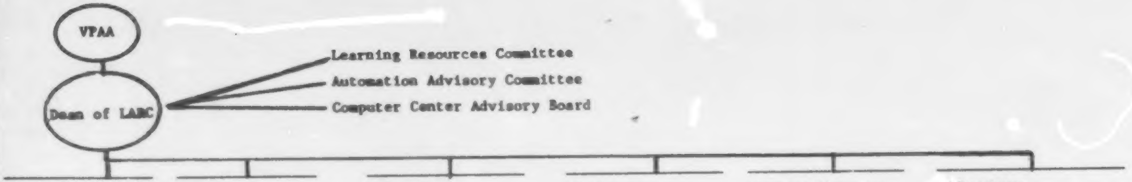
Systems and Technical Services, headed by Fred Ryan, does organizational systems design work, provides purchasing-cataloging-tracking of the collection, and maintains liaison with the CSUC System and California collection matters. OCLC (Ohio College Library Center) provides a nation-wide support for automating the whole business of catalogs, lists, updating of lists and such.

Public Services, headed by Bob Brennan, works with circulation, shelving, reference service, all kinds of special collections such as government documents, maps, curriculum materials, archives, and regional collections. Access to information is the task. It is an aggressive reference service. Just recently we have added a whole variety of data bases accessed by computer terminal. The Librarian is learning to educate the student user in search analysis, a new set of subject words, and the joy of spending time reading instead of hunting.

The Instructional Media Center under Royd Weintraub, is responsible for booking and scheduling as well as distributing nonprint materials both physically to lock boxes outside classrooms and electronically over the coaxial cable to the classroom and the region. Probably one of the most helpful and new things is what we call EMDCS, the Electronic Media Distribution Control System. It is a control system which, when a videotape is scheduled, sets a channel, sets a program Channel which tells what is on what channel and what time, reads the head of the tape to be sure the correct one has been mounted, waits for the exact access moment, and then, using coaxial cable, turns control over to the the designated classroom. The instructor then controls the start of the tape, can stop the tape, perform fast forward or rewind for a specific frame to show, and, when done, rewind the tape to indicate completion. At the scheduled moment of completion of the scheduled time, control is thrown back to the distribution center, the unit discharges the tape and another tape is mounted to meet the schedule. Thus control of the tape is with the instructor while the more expensive parts are protected in the distribution center with technicians. The other half of this system is coming on line now. Using an HP 3000 the user's request will be scheduled by a clerk using our new proram. The schedule will then be fed each morning to the terminal in the distribution center and the tape mounted. Eventually, when the campus is computer terminal equipped the faculty may operate directly using the department terminal and a longer form of the program. In addition to scheduling, booking, controlling, throwing control to the classroom, rewinding and discharging, the system will eventually record running time, maintenance requirements, inventory and down time data.

In addition to physical delivery to lock boxes, electronic delivery by coaxial cable and computing, the Media Center is responsible for photographic and graphics assigments from the University. Those work spaces, in addition to professionals, offers applied experience for interns from the CICS program. A special feature of the Media Center is a space we call the Media Prep area. That is two adjacent rooms, fully equipped, where faculty who wish, students who wish, and people becoming teachers who are assigned, come to prepare materials for their own educational purposes. This is the lowest level of service offered. One can also work with the professionals or ask for professional service to be provided.

Finally, the Instructional Media Center is the center for the microwave delivery system, a system that this spring will offer upper division


VPAA
Dean of LARC
Learning Resources Committee
Automation Advisory Committee
Computer Center Advisory Board

Assoc. Director University Library	Director-Public Services	Director-Technical Services	Director-Instructional Media Center	Deputy Director-Computer Center	Director-CICS (academic)
Responsible for:	Responsible for:	Responsible for:	Responsible for:	Responsible for:	Responsible for:
Relations with system, external units such as state Library, HEW, etc. Direction of the library including site, budget, personnel, collection	Circulation, curriculum materials, Government documents and maps, nonprint media utilization, reference, interlibrary loan, special collections, gifts and exchanges and computer assisted reference services (NYTDB, Lockheed). Relations with campus and North State Library System.	Serials, order, cataloging of all learning materials. System-wide and state committees dealing with automation. Heads the systems analysis and automation projects of LARC.	TV production and campus technical support of media, instructional development and booking and distribution (electronic and manual). Direction of IMC in support of instruction through photography, material preparation, graphic design. Shop 4. Relations with System and other governmental groups, NCHEC, Regional and Continuing Education.	Management of budget, personnel, systems for computing resources on 4 sets: local and System timeshare, local and System Batch; for center function, administrative support and academic support. Relations with the Division of Information Systems and feasibility studies, other campuses.	Management and academic leadership of BA/MA programs in public communications (radio, TV, graphics, journalism), instructional technology, information studies.

Figure 4: Organization Chart

courses, high interest courses, throughout northeast California—a space the size of Indiana. *What* is to be delivered is a function of the Vice President for Academic Affairs and the Council of University Deans and their faculties. *How* it is delivered is our problem. A special microwave sending room has been prepared with an engineering booth and microphones for each student station. When the system is turned on the instructor in Chico, offering a regularly scheduled course, teaches enrolled students from Yreka and Weed—3 hours north, Redding—an hour and a half north, Colusa an hour southwest, UC-Davis two hours south. There are 11 such sites. The students watch, ask questions either by phone or by radio, participate in the class just as though they were present. This spring we will offer a full day, 0800 to 2000 Monday through Thursday and 0800 to 1700 Friday. Weekends will remain more freely scheduled based on social and academic needs such as updating licensed personnel such as attorneys, physicians, and the like. It is a great way to have a meeting: one does not go, one turns on. That matters in mountain areas like ours.

Computing is still running its four systems, has divided into three subsets, presently operations, administrative support, and academic instructional support. Academic instructional support works primarily with those faculty who wish to use already existing programming, assigns support (quite often graduate students in computer science) to faculty wishing to develop computer applications for courses, and continues to assist in planning for 1990. Many are aware that we are getting new hardware within the next year or so through a state sponsored procurement. Not much can be done until that procurement is in place. Meanwhile, the CSUC System has provided our campus, as one of three such, a faculty member who is working in instructional computing full time.

CICS, the teaching department, has come alive under Dr. Jim Chu's lead, and may swallow us all. Again, using the Task Force approach the program was examined, designed, and is under way. Why is it appended to a service organization? Because the work of the other parts of LARC are the laboratory for that program. The program has three major components: public communications, instructional technology, and information studies. It is interdisciplinary. Faculty came from the original Mass Communications Department, Industry and Technology, Education, other campuses. The space in the then new building was designed for 80-100 students, a nice growth factor at that time. (CICS has 627 majors, 50 minors.) They still use the radio station for lab work but have added signal power, have added a reading service for the blind, have won national recognition for documentaries, California's 1979 Outstanding Journalism Teacher Award, and offer public radio services to the North Valley. The latest grant will allow extending the signal north, south and to the mountains east and west. The 60 percent of time required for the students' lab still leaves 40 percent available as currently programmed to extend culture and offer courses. There is a weekly newspaper which is lab generated, a paper supported by advertising, some support from Instructionally Related Activities, and gifts from the industry of hardware to augment that provided by the State. There is a magazine, IMPULSE, which combines the work of writers with those of designers. It, too, is supported by departmental budget and the Instructionally Related Activities budget. The television program uses both black and white as well as color for advanced students. Using both studios and a fully equipped color van the students produce public service announcements, support faculty requests for television through the Media Center, and crew for off-campus grant activities. In addition to the normal media, the unit offers work in design, photographic systems, public relations, and international communications. All those parts are centered around message design. The student chooses an application. The student by choice could shift the application easily. Wait until they find that out that they have a whole variety of media in which they can work! They were told, but they were so busy being loyal to their chosen medium that they may have forgotten.

Instructional Technology works closely with the Media Center. After the basic courses for the degree, those in message design, the students are expected to apply their skills by assisting clients in defining objectives, establishing critical path definition, selecting appropriate media and the like. They work with the sub-sets of learning.

Information Studies, our latest full-blown option, is preparing students to be intermediaries between the computer programmer and the naive client, to deal with commercially available large data bases, to professionally operate in the world of information through computing. Each has, as a requirement, a computer science minor.

How We Got There

How did we get there? There were several questions constantly asked. We got very, very tired of asking them. But, ask them we did. What does the user require? How does the user need it? If we do it that way can we continue to do it? What should we do first, what is the biggest bank for the buck? Step one was to inventory. What were the data about needs, users, training requirements? What were the data about the place we were? What were the staff and faculty potentials for change? What support (fiscal, administrative, Faculty Senate) could be counted on? What were CSUC System-wide limits or legal limits? Keeping those constantly before us we began. At that point a system, broadly scoped, was defined. The task was divided into several parts:

what will we be able to change almost immediately because no one would be particularly affected but service delivery would be improved; what would require retraining or reshaping in order to cause change; what would take a while because we'd be into traditional bedrock with attitude, performance, staff and organizational change? The next level of effort was to do long range planning involving all elements of the potential staff; professional, paraprofessional, and clerical. That plan required training for skill development, skills which were totally new to individuals who had been employed to continue the traditional patterns of work. This was a critical stage because there is little turn-over in the leading employment center in the community, a town located nearly 100 miles from the nearest metropolitan center for employment.

As planning progressed those individuals who were already skilled were encouraged to move, to define, to progress. Those individuals who had served on the Task Force were asked to begin immediately to continue the definition of "integration" and involve others, communicate constantly, and listen carefully.

First to move was the Director of the Instructional Media Center. By analysis it was clear that human delivery of equipment was costly, expensive in both damaged equipment and number of people required to perform the service. A grant was obtained to begin equipping the classrooms with media equipment in a booth, installation of a lock box for delivery and return of software. The media booth typically includes a Bell & Howell autoload 16mm projector, three sizes of take-up reels, a carousel slide projector, and an illuminated slide sorter. The equipment is locked down with chains and the booth itself is locked. Some of the classrooms also have tape recorders (playback units), overhead projectors, and a permanently installed screen. Additional equipment is installed, on academic unit request, such as image magnification and television cameras in one of the science rooms. Television monitors are installed along with control systems in some 50 classrooms.

Selection of rooms to be equipped with either a media booth or television was made on the recommendation of the academic department assigned that space. About the time the booth installation project was begun the Instructional Media Center had finished stringing underground coaxial cable throughout campus conduits. That cable was split in the buildings to allow for local classroom receipt of signal in parallel just as one receives a variety of channels over commercial television.

Next to move was the technical services staff of the Library. They began to order learning materials regardless of format. Retraining was accomplished by a process of workshop attendance as well as leadership from a newly filled position resulting from reorganization. That leadership was also competent in automation procedures, systems design, and ability to work consistently on issues while solving personnel reticence. Several grants were received including cataloging, nonprint media, all formats, into machine readable form. Specific cards appear in the card catalog just as cards for books have for years. As a result, the user has available all formats for a subject. Using the catalog the learner may access film, filmstrip, kit, realia, computer program, periodicals, microformat, books. The criterion is the nature of the question. The next step was slipping the nonprint reference (which had been in media booking) over into a section of the library. The section now includes reserve (short term loan) materials as well as all nonprint other than 16mm film. Selected videotapes were retained in a temperature-humidity controlled vault. Simultaneously, the former Library Committee was reorganized as a Learning Resources Committee. It became a group made up of one representative from each academic School appointed by the Faculty Senate and the Vice President for Academic Affairs. The Committee further included a representative from the Associated Students, the department heads of the Learning Activities Resource Center (LARC), and is chaired by the Dean of Learning Resources. A special Faculty Senate representative sits with the group.

There were two sub-committees designed to assist faculty, staff or students who wish to produce, the Faculty Rights Committee and the Production Development Committee. The former assists with the copyrighting of the proposed production while the latter assists with the design of the proposal, its kind of mediation, the budget and the actual crewing and scheduling of the project. Both committees are made up of professionals in the field as well as a good lacing of Faculty Senate appointees.

Where Are We Now

At this point we are slowing down. Not because we are THERE but because the sheer numbers of users are wearing us out. They are not yet to a point in skill where they can use us easily. We still spend a great deal of our time in aggressive reference, aggressive support, and encouraging the shy. We have about 12,000 students and 650 faculty. We have many days in just the Library when we have 10,000 users. We are creating a true learning society and we're finding only small bits of time to move forward. But, the zest, the élan, the joy, the fatigue by Friday!

Where we are now is deep in additional planning. We have done the first three cuts of system design. We have goals, objectives. We are expecting to *complete* the task, assignment of cost centers, and arraying of specifics by early 1980. Our campus insists on campus-wide planning. Disonance can then be anticipated; mutual growth can be matched encouragement or lack of support can be communicated.

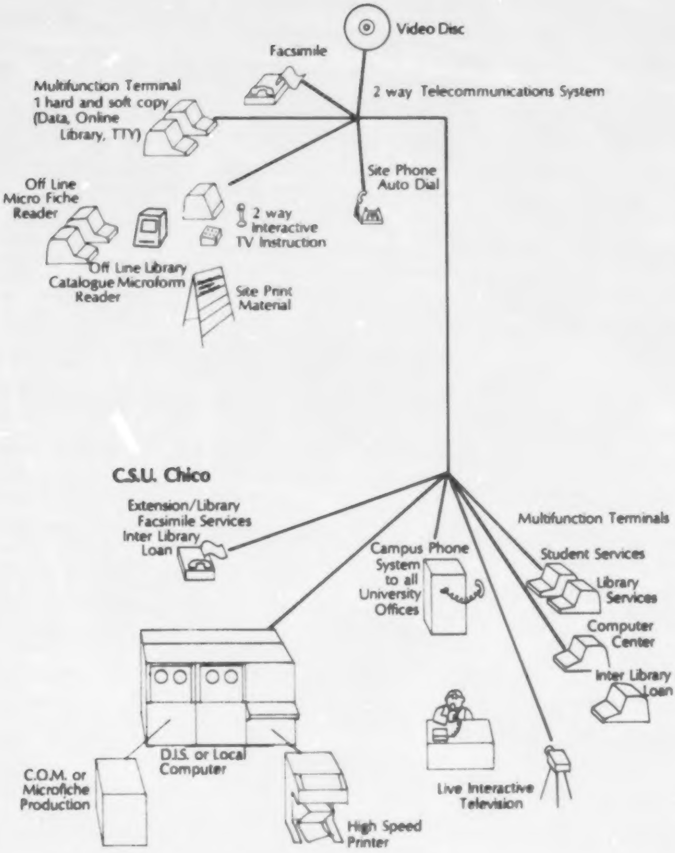


Figure 5: Learning Center Site

The Future

By 1990 we anticipate a drop in enrollment on our campus. We anticipate heavier more diverse use of the resources. We expect users to report their learning in papers, photographs, tapes, films and models. We expect a large part of our learners and users to be the folks who live in the mountains, folks who are the product of long periods of war, double sessions, and isolation. We anticipate we will become a true social center for change, for information, for reducing social distance. Hardware as a system, should assist the skillful, the curious, or the learner receive the message of the University. Much of it will not be in formal courses. Much of it will be in harmony with the Public Broadcast Commission, it will have three parts: culture, information, and course work. It will also provide a place for potential communicators to learn their art.

Meanwhile, we are defining the nature, function, personnel needed, equipment required for some 30 learning centers, locations at the end of the microwave. We are participating in the 19-campus System in requesting support for interconnecting all the campuses for exchange of materials, holding meetings, computer application development, broadening offerings. We are splitting the signal on the coaxial cable so that through appropriate outlets we can have telephone, media, terminals in all spaces—offices, classrooms, meeting rooms. Why not? The edge of technology is relatively available.

What Users Need to Know

Any support system should be as invisible as possible. If it shows, it is probably not very efficient. In our work we find that a minimum of "how to use" is probably enough. Each Winter, during January, we have one week set aside for faculty development. During that week we have workshops led by fellow faculty and a few outside faculty who present workshops on how to, what to, and measuring the effect. That week is a plethora of workshops. We have an intake through the Faculty Development Program, funded with both positions and money, for development of instructional projects. It is administered out of the Graduate School and Grants Office. Each year interested faculty submit requests for funding. Those that are not directly funded usually lead to the department underwriting the project.

Probably the most startling truth we have discovered is that there is a tremendous amount of interest and ability out there. Releasing the energy is the task, the goal, the role of the developer.

Regional Use of Technology in Education

Harold Morse, Director, Educational Division, Appalachian Regional Commission, Washington, DC

Technology

How we reach our audience, or the technology aspect, has its beginning in 1974 with the uplink to NASA's ATS-6 satellite. On June 30 of last year, service on ATS-6 was discontinued and we began programming mornings during the week on RCA's Satcom I. This will increase to 60 hours per week by fall of 1980. The studio and single satellite uplink are located at the University of Kentucky.

The signal, via Satcom I, is received by an earth station. Most of these stations are located with cable TV operators, but for those areas not serviced by cable we have set up our own earth stations. The programming is then distributed to the viewer directly via cable or more likely to sites via tape delay.

This single uplink, with the capacity to reach the entire nation as well as all sites within the Appalachian Region, represents not only an alternative education delivery system that is highly technical but also one that is cost-effective. That is, delivering programming to a virtually countless number of sites within the U.S. by means of one studio and uplink to the satellite is less expensive than conventional means of delivery.

Another point to note while speaking of the technology framework within which ACSN operates is the virtual simplicity of the equipment on the consumer end of our operation. Most American homes do have television sets and do use them. So even at most complicated, ACSN is simply offering an alternative use of the television with which we are all familiar.

Programming

What we offer the individual is a broad spectrum of programming in the form of courses, workshops or topics of interest to the community. Before describing these in greater depth it might be useful to detail the process that leads to decision-making on programming. In each region where we have sites there is a regional director who is responsible for the operation and coordination of the activities within that region. In addition to this person and to keep ACSN aware of community needs there are advisory boards that have representatives from the areas of health, education, human services, business/industry & state/local government among their members. These advisory boards act as program reviewers and in general help keep the two-way lines of communication open so that the Central Office is able to be responsive to the communities in terms of programming and so that the individual communities are able to plan systems to meet the needs of their people. The system is what we call consumer- or user-driven.

We offer, therefore, a broad range of programming, as I mentioned before, in the form of courses, workshops and informational programming. Courses can be set up, depending on the site and the cooperation of the local community college, college or university, so that the individual may gain undergraduate, graduate and continuing education credit while viewing programs at home and completing related assignments.

Examples of courses we have offered or are presently offering are:

—Rehabilitative Nursing for the Older Client
—Teaching the Young Handicapped Child
—Community Health/Planning Administration, developed by the University of Cincinnati, which is a two-year, non-residency Master's Degree program for professionals in health fields who want to acquire an advanced degree while working.
—Personal Finance
—Diagnostic and Prescriptive Reading Instruction
—The Growing Years
—Engineering Economy, a course focused on economic evaluation & financial analysis of engineering alternatives developed by Colorado State University and adopted for use of ACSN in cooperation with the Association for Media-Based Continuing Education for Engineers, Inc. (AMCEE).
—Keep It Running—the basic on how your car runs.

The workshops are prepared, on the other hand, to address specific needs where a complete course may not be available or may not be needed to solve the problem. The most up-to-date videotapes and films are assembled. Authorities in the particular area of concern are brought to a central television studio and toll-free telephone lines are available for viewers to call in their questions. Viewers can then, if it has been arranged through their community cable companies, participate at home or at a school, as arranged locally.

As an example, last October we presented the Living Heart Workshop, a discussion of cardiovascular disease, with Dr. Michael DeBakey as the major participant.

To illustrate another facet of the workshop and the practical use of sophisticated satellite technology, in 1978 we broadcast the annual meeting of the Council for Exceptional Children from Paris, France, along with a live two-way interactive system of "800" lines to connect communities in the U.S. with the participants in France.

In fact we are now in the planning stage of a similar workshop to be broadcast from AECT's annual convention in Denver.

Other examples of workshops that have been offered are:

—A series on child abuse for the social worker
—The Language of Caring—for the more personal care of patients by hospital personnel
—Reading Is Fundamental
—A series on Resource Management for education
—Allied Health
—Copyright Law for Educators
—Building Your Own Successful Business

The third aspect of programming is that geared toward community service or one-way informational programming. The purpose of this series is to provide timely information on topics of interest to the consumer. Some of the subject areas include energy, inflation, the economy, aging, recreation, health, family, the arts and travel. For example, in the energy area there was presented a series on Home Winterization.

The Audience

The "who" aspect of ACSN, that is, who are we serving, is answered fairly well by a good look at our course/workshop and informational programming.

A little more specifically, among home viewers it is, among others, the senior citizen or consumer.

We also aid the academic community in fulfilling their mandate to educate the community by supplementing community college, college and university continuing education programs.

And in the area of professional development, we provide teachers, health and other professionals with in-service training opportunities that are not only accessible, but convenient.

CONCLUSION

ACSN offers a unique package that uses different pieces of an already existing educational network, that is, local and regional school systems and community colleges, colleges and universities, and combines this with advanced telecommunications technology.

This, plus our own additions of regional directors and advisory boards, creates a system responsive to community needs. An educational system that in fact goes far beyond the mode of instructional television and that is a community service network.

The Educational Telecommunications for Alaska Project

William J. Bramble, Project Director
Alaska Department of Education

This paper is an overview of the Educational Telecommunications for Alaska (ETA) Project and a discussion of the professional development issues we have faced in the project.

PROJECT OVERVIEW

Project ETA is a five-year project funded jointly by the state of Alaska and the National Institute of Education. The project was initially funded in September, 1977 and the design, development, pilot testing, and institutionalization of major systems is to be accomplished by 1982. Thereafter, a maintenance level of funding is to be provided by the state for management, technical assistance, and further development of the Project ETA systems. Operational costs of proven systems are to be assumed by the users of the systems. Funding for the five-year project is approximately $6.5 million and is split almost equally between the state and NIE.

The purpose of the project is to utilize telecommunications and technology to address several pressing educational needs in the state. Three major systems are being developed and tested. These include the following:

- an electronic mail system for administrative communications;
- an information identification and retrieval system;
- a computer-based, individualized instruction program for rural high school students.

Background

Alaska is an immense, sparsely populated state. The state covers a land area about a fifth as large as the contiguous 48 states. Approximately 400,000 persons reside in the state and sixty per cent of these individuals live in three major cities in the state; Anchorage, Fairbanks, and Juneau. Alaska encompasses a large land area, but even more significant is the amount of the earth's surface area covered by the state. Alaska includes thousands of islands and the distance between the extreme corners of the state roughly equals the distance across the continental U.S.

Alaska includes a great deal of very rugged terrain and a variety of climates ranging from maritime to arctic. The state has few roads or railroads, and much of the transportation in the state is by airplane or boat. Broad telephone, radio, and television coverage is only now becoming feasible using sophisticated communications satellites. Although the larger population centers in the state have reasonable access to most services available through these modes of communications, the provision of such services to remote, rural areas is still in its infancy.

Public school educators in Alaska face many severe problems associated with isolation and communications difficulties. Critical administrative communications between the school districts and the Department of Education are difficult. Small staff size and heavy demands on teachers for a variety of non-standard work activities make it difficult to offer a comprehensive curriculum and provide necessary assistance and attention to individual students.

Problems related to instruction are exacerbated in the many small villages in Alaska. These villages are largely composed of native Americans who belong to several native groups represented in the state. These groups include Inupiat and Yupik Eskimos, Athpascans, Aleuts, Tlingits, and Tshimshians. A typical village includes about 100 or so individuals and has a school-age population of 20–25 children, often with special educational needs and requirements and a unique cultural perspective. The village school has two classrooms; one for lower and one for upper grades. The two school teachers typically are assigned to elementary vs. middle and upper-school grades. Coping with the instructional demands of the variety of students represented is difficult. Offering a comprehensive and quality curriculum for the students at the high school level is especially difficult. Further, the isolation of many villages makes access to educational resources a problem.

PROJECT OBJECTIVES

Given this context, and based on a survey of educational needs and a study of feasible technologies, the ETA project was designed to accomplish the following objectives:

- To design, develop, and install a model administrative communications system interconnecting the Department of Education, intermediate and other educational agencies, and local school districts that provides more efficient management of public education in the state by permitting message transference, timely input, and enhanced field participation;

- To design, develop, and install a system for rapid access by teachers, administrators, and other professional educators to repositories of in and out-of-state resources.
- To design, develop, and install a technologically based system of instruction for rural high school students which will increase both the quantity and quality of the course offerings and result in greater equality of access to education for this group of students.

A fuller description of each of these systems or project components follows.

PROJECT COMPONENTS*

Administrative Communication Network

This network was developed around the concept of an electronic mail system. A communications terminal has been installed at over 60 locations which includes the following equipment:

- GNAT System 9 micro-computer
- Beehive/Micro B-2 CRT terminal w/keyboard
- Teletype/Model 43 printer w/keyboard
- Vadec/VA3455 modem
- Data phone

This equipment allows for off-line composition and editing of messages and rapid batch transmission of these messages to the nearest communication network access point via telephone. These access nodes are located in Fairbanks, Anchorage, Ketchikan, and Juneau and interconnected by high-speed (9600d.b.s.) lines leased from the state's long-lines carrier (ALASCOM). The leased network includes a combination of satellite and terrestrial links.

All messages are then transmitted over this leased network to a central PDP 11/70 minicomputer located in the State Office Building in Juneau.

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* The design, development, and installation of these systems was accomplished with contractual assistance of a number of agencies. Among these are: Northwest Regional Educational Laboratory; Division of Data Processing, Alaska Department of Administration; Division of Communications, Alaska Department of Transportation and Public Facilities; Southeast Regional Resource Center; Southcentral Resource Center; and TransAlaska Data Systems.

Each agency has one or more "mailboxes" which are secured via a system of account numbers and passwords. Mail can be composed off-line and sent to one or any number of the other mailboxes using rapid, batch transmissions.

Receipt of messages is automatically recorded by the system and usually occurs within a few hours after the message is sent. Compared with the several-day to several-week delivery time experienced in Alaska using the U.S. Postal Service this represents an obvious advantage for time-critical messages. Although slower than completing an initial phone call, the service often compares well with the time required to actually reach a desired party by phone and allows the contacted party time to locate necessary information required for a response. Further, hard copy of the message is available to both the initiator and recipient of a message. The price of a typical message is around $.50 to $1.00 compared with $.15 for a letter and several dollars for a standard intrastate phone call.

The administrative communications network was pilot tested in 1978, installed in the first half of 1979, and is currently carrying several thousand messages per month. Usage is increasing monthly. An important side benefit to the system is the capacity of the micro-computer terminal to accomplish local data processing for all but the largest school districts and store and transmit required data to the department. The software required for this added capability is currently under development. The evaluation data we have collected for the system are very positive. Although the initial reaction of local administrators was one of enthusiasm tempered by awe and skepticism, current responses are positive and almost matter-of-fact. The users of the system in many instances now regard the system as the routine way to process a variety of transactions and depend upon it to conduct business. System reliability, a problem in the pilot testing and early installation phases, is now quite good. Operator training, a topic addressed in more detail later in this paper is not currently a problem.

Some illustrative uses of the administrative communications network follow. A local superintendent uses the system to request clarification of a request or regulation from the Department of Education, transmits information to the department about the number of students in a given federally funded program or information about a new school transportation contract. The local district office contacts an intermediate educational agency to request the services of an itinerant school psychologist and schedules the visitation. The district office contacts other districts to request assistance in setting up a new instructional program or schedules the visit of an athletic team. The department uses the system to check with local districts on precise current enrollments of various categories of students, to obtain clarification on new bus routes or food services, to obtain clarification on items contained in grant requests, or to schedule and make last minute revisions on travel of department personnel, to provide updates on information regarding pending legislation and so forth.

Resource Identification and Retrieval System

The purpose of the resource identification and retrieval system is to make in and out-of-state educational data bases available to public school educators in the state. Through separate funding from the National Institute of Education the department's Program Development and Dissemination Unit has, over a period of several years, developed the capability to conduct searches of a variety of data bases available at the San Mateo Educational Resource Center and to report the results of such searches to teachers and administrators throughout the state. Plans were also laid to develop in-state data bases such as a talent bank of individuals with special areas of expertise, a compilation of exceptional programs or "promising practices," a catalog of educational resources available within the state, and so forth.

Through a cooperative effort with the ETA project, plans were developed to construct and computerize the in-state data bases and develop the capability for remotely accessing this data base from the intermediate education agencies and ultimately from local school districts. Further, to provide rapid access to these types of information the capacity for rapid electronic delivery of at least some of the available information obtained through computerized searches was planned.

As of this date, the in-state data bases have been developed. The computerization of this system has been completed and the system resides on the department's PDP 11/70 computer which is accessible by the communication network terminals. Computerized retrieval procedures are in place and persons have been trained to access the data bases at the department and two of the four intermediate education agencies in the state. Training on the system is progressing and, ultimately, computerized searches will be possible from any school district in the state. Searches of national data bases can be requested via the communications network but the rapid electronic delivery of items from these searches, beyond identified abstracts, is not feasible at present.

Enthusiasm for this system is great, and requests for searches are running about 600 per month.

Technologically Based System for Rural High School Instruction

The problems of local access to a quality education in rural Alaska are many, as you might imagine from the context of village education. However, the state must provide such access. It does not have the choice, given a recent legal decision* of a boarding school model, nor was this found to be successful in the past. In order to provide the breadth and quality of curriculum offerings required for a quality education in this setting the department is exploring the use of educational technology for instruction. It is hoped that through a "capital investment" in equipment, instructional procedures, software, and instructional products, rather than an infeasible additional "labor investment," the department can assist rural schools, particularly the village schools, to provide access for the students to quality programs of high school instruction.

The technologically based system of instruction that has been designed is a program of individualized instruction using an Apple II microcomputer for student record keeping, drill and practice, and testing; a student manual; a complete set of audio tapes which explain and amplify concepts, guide the students through worksheets, or provide dramatic narrations; a set of worksheets and tests; and supplemental readings and materials. The courses contain sufficient materials and activities for a full year of instruction. The courses can be used in a stand-alone mode at the school and access via audio teleconferencing to a subject matter expert elsewhere in the state is provided. Alternatively, since the courses are not modularized, a classroom teacher can use the modules to augment classroom instruction or carry portions of the instructional load.

To date, two such courses have been produced by the project: Alaska History and ninth-grade English. Two additional courses, general mathematics and developmental reading, are due for completion prior to the 1980–81 school year.

The Alaska History and English courses are currently being pilot tested in seven rural Alaska schools. Additional schools will be using the courses beginning with the second semester of this school year. Although the evaluation results are not in at present, the preliminary data indicate a high degree of success in terms of student achievement and participant satisfaction.

ISSUES IN PROFESSIONAL DEVELOPMENT

The problems we faced in training and staff development in the ETA project were far more complicated than could be solved through a task analysis and prescriptive training approach. The complications were of many types but the greatest of these were associated with the level of unfamiliar technology being used and the difficulty of introducing such an innovation.

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* Tobeluk vs. Lind

From the beginning, the thrust of the project and the formal agreement between the state and the federal government was that all major project components were to be fully institutionalized at the completion of the project. Thus, training and professional development constituted a very important area of concern right from the onset. For the components to be fully functioning and to have a reasonable chance for long-term continuance, it was essential that the people involved know how to use the systems and were willing to use them. Further, a mechanism for continued training had to be in place.

During the design phase of the project we adopted several principles that governed our project design and ultimately our plans for training and professional development. These were the following:

1. The probability of success with innovation requiring behavioral changes is inversely proportional to the amount of change required. A strategy involving relatively small incremental steps is optimal.
2. In implementing a change in behavior of a given magnitude, a reward of relatively equal magnitude must be provided or innovative behavior will not be sustained after the novelty wears off. Further, extrinsic rewards are more important than intrinsic rewards in this instance.
3. Change in *process* or techniques in education is more probable in success than in *content*. In an attempt to change both simultaneously, the overall probability of success is significantly diminished.
4. Any technologically based system must be as fail-safe and user oriented as possible. Also, the technological subsystems should not be so interdependent that the failure of one subsystem causes the whole system to fail. Technical training requirements for the use of the technology should be held to an absolute minimum.
5. The probability of continued use of educational technology is directly related to the degree of compatibility and support of the environment in which the technology is to be used. In the design of systems and training procedures, the environmental factors need to be taken into account.

These five principles emerged as we made decisions about the design of project components. The principles were applied during the component design phase, but it was clear that they needed to be applied again during the design of training and professional development subcomponents. The principles themselves, and the particular effects they had on component design, affected the form of training programs for project components in many ways. This is illustrated through a point-by-point consideration of the principles which follows.

1. The probability of success with innovation requiring behavioral changes is inversely proportional to the amount of change being required.

In the design of the administrative communications network, although more sophisticated local data processing and data reporting applications were ultimately envisioned, the initial use of the system was as an electronic transmission system for message transference. Implementation and training for more sophisticated uses are to be added after the users become proficient and feel comfortable with the existing system. In the design of the resource identification and retrieval component of the project a staged process was also followed. Training for data base searches was for department personnel who conducted such searches at first. Later these persons began to train intermediate education agency staff, and ultimately the intermediate agency staff will train local school administrators and staff.

In the design of the computer-based instructional component the principle applied in a somewhat different way. A strategy was devised wherein familiar core area courses were selected and the majority of content presentation was via printed materials. All audio and computer materials were backed up by printed materials. The instructional formats (e.g., computer drills) were kept as simple as possible. Thus there is always a printed instructional backup for the teacher to fall back on. The system is being kept simple in form at first, and more sophisticated features will be added later.

2. In implementing a change in behavior of a given magnitude, a reward of relatively equal magnitude must be provided or innovative behavior will not be sustained after the novelty wears off.

This proved to be an area of extreme challenge for the project. We proceeded in the following way. The initial rewards offered by the administrative communications network were associated with the placement of an administrative communications network terminal in each school district office. This immediately provided better communications with other education agencies and held considerable promise for later local data processing applications. This reward was primarily for local district administrators and resulted in increased support from these persons. Our hope is that this support will translate into a set of rewards for local district personnel who become involved with other technological systems.

At the local school level, every effort was made in the design of the instructional system to provide needed products which would benefit the teacher and yet allow the teacher to retain some of the more enjoyable aspects of instruction. For example, one of the first courses developed was Alaska History. No really suitable up-to-date set of Alaska History materials had existed prior to this course. Each of the course packages contains a wide array of materials. These include published and unpublished readings, worksheets, tests, drills, and so forth. Another intrinsic reward involves the availability of university course credit for training activities.

3. Change in process or techniques in education is more probable in success than change in content. In an attempt to change both simultaneously the overall probability of success is diminished.

Changing the content of what is being facilitated through technology, in addition to introducing the system itself, often results in asking persons to obtain a new set of priorities or a changed understanding and this can often result in resistance to change. For example, in the design of the electronic mail system we chose a traditional message format similar to the memo or letter format, rather than complicated new departmental reporting applications as a first use. Since familiar message formats were used, the training focused on the techniques of transmission rather than on the form of messages. As another example, the newly constructed in-state data bases for the resource identification and retrieval system included projects, personnel, and agencies familiar in and already doing a good job in the state. We felt that these would not be totally foreign to the requesters or be judged as out-of-step with the requesters' experiences. What was new in this component was the systemization of the knowledge contained in data base and the techniques and speed of access. Finally, in the computer-based instructional component the new element was the use of the technology. Teachers were not unfamiliar with individualization of instruction through individual education plans (IEPs). The courses chosen were in familiar core area subject-matter and were adapted from familiar correspondence study packages or textbooks. What were new in this case were the use of the technology and the techniques for assisting students with the technological mode of instruction.

4. Any technological system must be as fail-safe and as user oriented as possible. Subsystem interdependence should be minimized.

In all of the technological systems care was taken to obtain reliable hardware and software, to provide back up units where feasible, and to install the best possible maintenance plan for both hardware and software. Every effort was made to obviate the necessity for users to be expert in data processing (e.g., know computer programming) or be hardware experts as a prerequisite for using any system. Thus, all systems operate using on-screen prompts in normal English and English commands. Maintenance (always a problem in Alaska) is provided through contracts with vendors.

Examples of some of the points made above are dual keyboards for the printer and the CRT in the administrative communications network, local processing capability rather than dependence on a large central computer for the instructional system, back up floppy disk drives* for the instructional terminals, the careful selection of equipment and installation of comprehensive swap-out or on-site maintenance contracts, and complete sets of prompts and "help screens" in the software used in the systems. All of the above helped reduce the amount of training needed for the systems and helped make the systems more reliable and less frustrating to operate.

5. The probability of continued use of educational technology is directly related to the degree of compatibility and support of the environment in which the technology is to be used. The design of systems and training procedures needs to take this into account.

Through previous examples I have shown how the technological systems were designed, as far as possible, for use with familiar products and situations. However, this was only one aspect of creation of a supportive environment for installation and use of the systems. The concern for a supportive environment was the primary reason for the installation of the administrative network *prior to* the installation of the other systems. A great deal of emphasis was also placed on informing local administrators as fully as possible of the potentials of the project components. We felt that we had to have a high level of administrative support for the project prior to the installation of the remaining components. As this support began to emerge, we then concentrated our demonstrations and presentations more at the district staff level in an effort to gain peer-level support for the installation of the remaining two components. Our sequence for training followed the same pattern. District administrative staffs received training before building-level staffs. The other very important factor in this category influencing both system design and training was the necessity to avoid having unreasonable expectations of others in the environment for new behaviors essential to the implementation of project components. This ultimately meant training individuals to use new technology within the existing environment, not training individuals as change agents under a model where the environment had to change to support new technological systems. Where substantial changes of others in the environment were needed, and could not be avoided, we included these persons in training sessions with our target users. For example, since a method for flexible student scheduling was required in computer-based instruction components, we included building principles in the teacher training sessions.

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* This component was found to be most likely to fail during early pilot testing.

In summarizing this section let me say again that the principles I discussed above affected both system design and training or professional development. These principles were adopted rather informally during the months in which the basic design decisions were made for the project. However, because of our belief in them the particular ETA systems emerged and, concomitantly, a pretty clear context for training and professional development resulted.

Given this context, the remaining decisions about training and professional development were made. First, the tasks to be accomplished by each participant were specified and specific training for each designed. To support training efforts we have developed complete manuals for all procedures for hardware and software use and maintenance, and so forth. We have provided both centralized and onsite training. We have provided periodic retraining where indicated. We are building the capacity in regional and local agencies for continued training on all systems. We have also worked with the University of Alaska to establish both preservice and inservice programs which will allow for greater availability of training and use of the systems in the future.

Through the project we hope, through technology, to improve the quality of education in Alaska for many years to come.

Educational Database Systems and the Classroom Teacher

Fred S. Rosenau, Far West Laboratory for Educational Research and Development, Washington, DC

INTRODUCTION

> Technology has two faces, benign and threatening.
> We cannot retreat into a non-technological Eden which never existed.
>
> — C. P. Snow

> Students at poorer schools and colleges suffer from a starvation information menu because their schools simply cannot afford to both acquire and maintain traditional hard copy holdings, as well as install and operate newer online equipment and services, as well as microform media.
>
> —F. W. Horton, Jr.
> *Information World*
> (November 1979)

> School boards must maintain teacher morale and sustain the flow of new ideas at a time when few young teachers are coming into the system, and when those who do find jobs face limited prospects for advancement.
>
> —Edward B. Fiske
> *The New York Times*
> (November 11, 1979)

These three comments suggest some underlying concepts that should be kept in mind in any consideration of those educational database systems that might be tapped for school improvement efforts in the 1980s. Moreover, in this paper we will argue that the role of a human linking agent is absolutely essential if classroom teachers are to discover and utilize the potential of today's technological information systems.

The Status Quo

In separate interviews, conducted in late 1979, both Willard McGuire, president of the National Education Association, and Albert Shanker, president of the American Federation of Teachers, spoke to the issue of how well their members' needs are being served by the various Federally supported dissemination networks.[1] Given their views, it would appear that almost any database system is as alien to the classroom teacher as a submarine anchored near Muskogee, Oklahoma, or London Bridge placed in the Mojave Desert. Both are *there* — now — but they appear out of place in our perceptions of "normalcy."

McGuire, among other points, emphasized that an educator can find out that there's a lot of information but that it's "somewhere else." He asserted that "nothing is as all-time-consuming as the classroom teacher's life . . . time restrictions place a limit on dissemination," which must be made convenient for the teacher. Moreover, "to get something disseminated and used, it must meet teacher priorities."

Shanker pointed to the very small impact, to date, of the Federally funded dissemination efforts. Fewer than 2,000 of the 50,000 members of his local union in New York City have even heard about the networks intended to link educators to database systems and useful products and processes.

If we use a similar frame of reference, would not Figures 1 and 1a (reproduced courtesy of the New Jersey Institute of Technology) appear alien to virtually every classroom teacher employed in our elementary and high schools today? How many teachers could even visualize the sophisticated hardware set up to form an online information center using telecommunications at the recent White House Conference on Library and Information Services?

Indeed, are not many of us, teachers and other educators, concerned when we read about a robot internal mail delivery system that replaces a human who formerly pushed a mail cart? Or about machines that can type a letter from the spoken word and reproduce it in vast quantities without a human hand? We may scoff, but educators do become fearful about technological implications that appear to be likely to add more people to unemployment lines.

According to the organizers of the recent White House Conference, there are some 216 million users and *potential* users of libraries and information services in this country. And there now exists a full array of database systems that could be tapped. The issue we must face is simply how to narrow the apparent gap between school-building personnel and modern information systems.

Databases, Clearinghouses and Networks

We cannot reproduce here the full contents of two recent publications. They are revisions of a set of "Information Resources for Edu-

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[1] See the *Educational Diffusion* newsletter for November 1979 and January 1980.

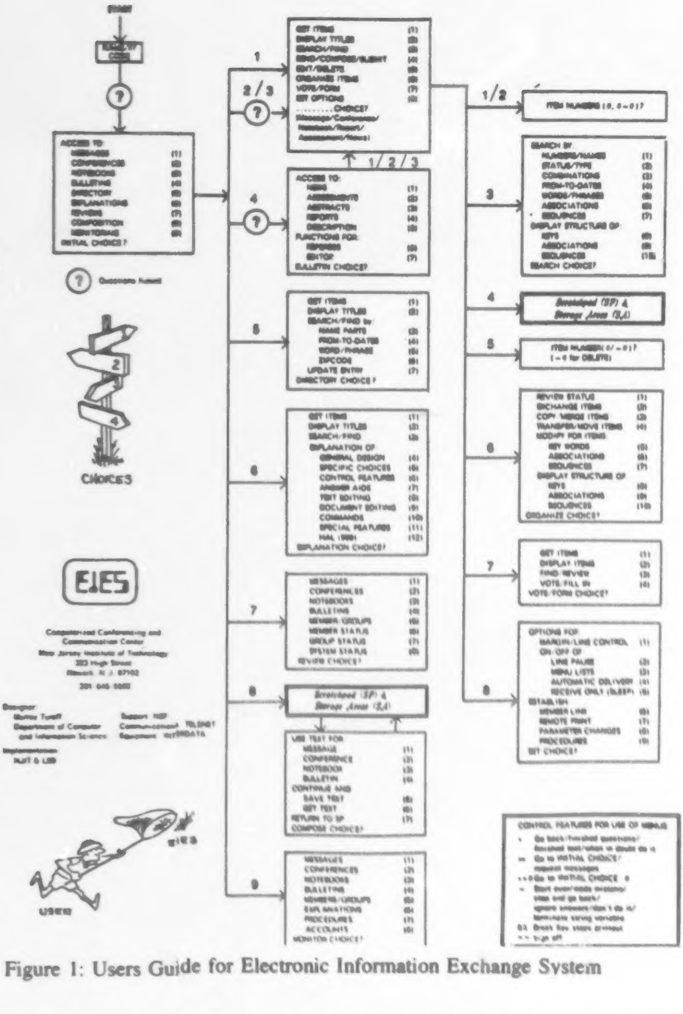

Figure 1: Users Guide for Electronic Information Exchange System

cation'' that were prepared as support materials for the 1978 National Dissemination Forum in Washington, DC.

The first is *Databases and Clearinghouses* (1979).[2] An abstract and some sample pages from that 172-page volume appear in Figures 2a, 2b, 2c, 2d, 2e and 2f.

The second is *Dissemination Networks* (1980, in press) which describes the various Federally funded efforts now working to meet the needs of practicing educators. These include:

- National Diffusion Network (NDN)
- Research and Development Exchange (RD_x)

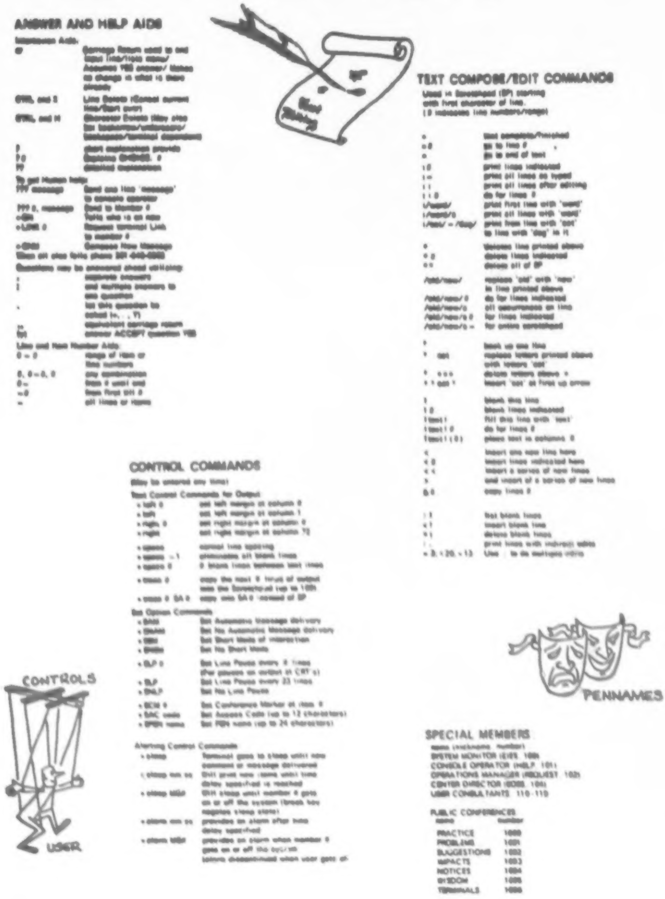
ANSWER AND HELP AIDS
TEXT COMPOSE/EDIT COMMANDS
CONTROL COMMANDS
CONTROLS
USER
PENNAMES
SPECIAL MEMBERS
PUBLIC CONFERENCES
PRACTICE 1000
PROBLEMS 1001
SUGGESTIONS 1002
IMPACTS 1003
NOTICES 1004
WISDOM 1005
TERMINALS 1006

Figure 1a

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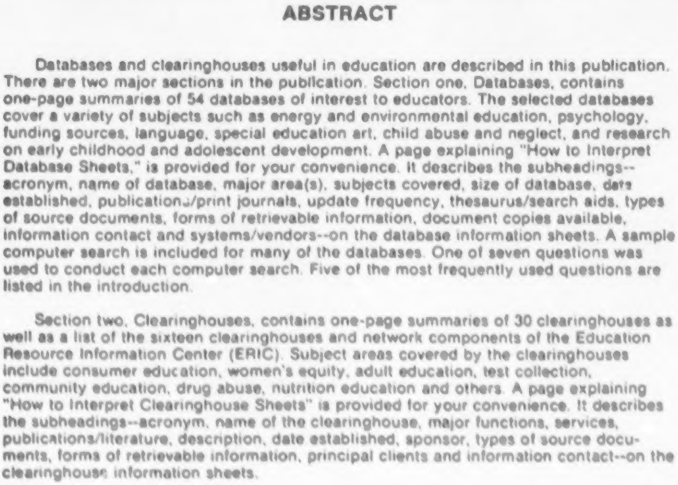
[3] Published by Resource and Referral Service, National Center for Research in Vocational Education, Ohio State University, Columbus, Ohio.

- Curriculum Coordination Centers (Vocational Education)
- National Inservice Network (Special Education)
- Centers for Bilingual Education
- Desegregation Assistance Centers
- Regional Offices of Educational Programs

and many more.

In addition, a number of annual catalogs are issued, under Federal and/or state auspices, to provide information on exemplary or innovative programs, demonstration projects, and other new resources intended to assist in school or postsecondary improvement endeavors. These include among others: *Educational Programs That Work*[3] (sixth edition, 1979) and *Resources for Change—A Guide to Projects 1979-1980*[4].



ABSTRACT

Databases and clearinghouses useful in education are described in this publication. There are two major sections in the publication. Section one, Databases, contains one-page summaries of 54 databases of interest to educators. The selected databases cover a variety of subjects such as energy and environmental education, psychology, funding sources, language, special education art, child abuse and neglect, and research on early childhood and adolescent development. A page explaining "How to Interpret Database Sheets," is provided for your convenience. It describes the subheadings--acronym, name of database, major area(s), subjects covered, size of database, date established, publications/print journals, update frequency, thesaurus/search aids, types of source documents, forms of retrievable information, document copies available, information contact and systems/vendors--on the database information sheets. A sample computer search is included for many of the databases. One of seven questions was used to conduct each computer search. Five of the most frequently used questions are listed in the introduction.

Section two, Clearinghouses, contains one-page summaries of 30 clearinghouses as well as a list of the sixteen clearinghouses and network components of the Education Resource Information Center (ERIC). Subject areas covered by the clearinghouses include consumer education, women's equity, adult education, test collection, community education, drug abuse, nutrition education and others. A page explaining "How to Interpret Clearinghouse Sheets" is provided for your convenience. It describes the subheadings--acronym, name of the clearinghouse, major functions, services, publications/literature, description, date established, sponsor, types of source documents, forms of retrievable information, principal clients and information contact--on the clearinghouse information sheets.

Figure 2.

The databases, clearinghouses, and networks are in place, or will shortly be in place. What is even more startling is the technological rapidity with which they can be searched by professionals skilled in their use. This last category, however, includes very few teachers. For, as Martha Dell Sanders of the Kentucky Education Association has pointed out, we must "take into account that teachers have rigid schedules. They have virtually no time to interact with other teachers or do team planning. They are literally divorced from the decision-making process and all of them need substantial clerical help."[5]

DATABASE	MAJOR AREA(S)
CEC (Exceptional Child Education Resources)	Handicapped/gifted education 28
CIN (Chemical Industry Notes)	Chemical industry and business information 30
CIS INDEX (Congressional Information Service Index)	U.S. Congress publications 32
CONFERENCE PAPERS INDEX	Life sciences, physical sciences, engineering 34
CRECORD or C-RECORD (Congressional Record)	Daily proceedings in Congress 36
CRIS (Current Research Information System)	Research in agriculture, forestry and related areas 38
ENERGYLINE	Energy 40
ENVIROLINE	Environment 42
ERIC (Educational Resources Information Center)	Education.................................. 44
FEDREG (Federal Register)	Federal regulatory agency actions......... 46
FOUNDATION DIRECTORY	Grant-giving foundations 48
FOUNDATION GRANTS INDEX	Grants awarded by foundations 50
GIS (Grant Information System)	Grants available in all areas............... 52
HA (Historical Abstracts)	World history, excluding U.S. and Canada (1450 to present) 54
ISMEC (Information Service in Mechanical Engineering)	Mechanical engineering, production engineering, engineering management ... 56
LIBCON	Books cataloged by the Library of Congress58
LLBA (Language and Language Behavior Abstracts)	Language behavior, linguistics, and related disciplines 60

Figure 2b

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[3] Published for the U. S. Office of Education by Far West Laboratory for Educational Research and Development, San Francisco, California.

[4] Available from Superintendent of Documents, U. S. Government Printing Office, Washington, DC.

[5] From an unpublished paper, 1979

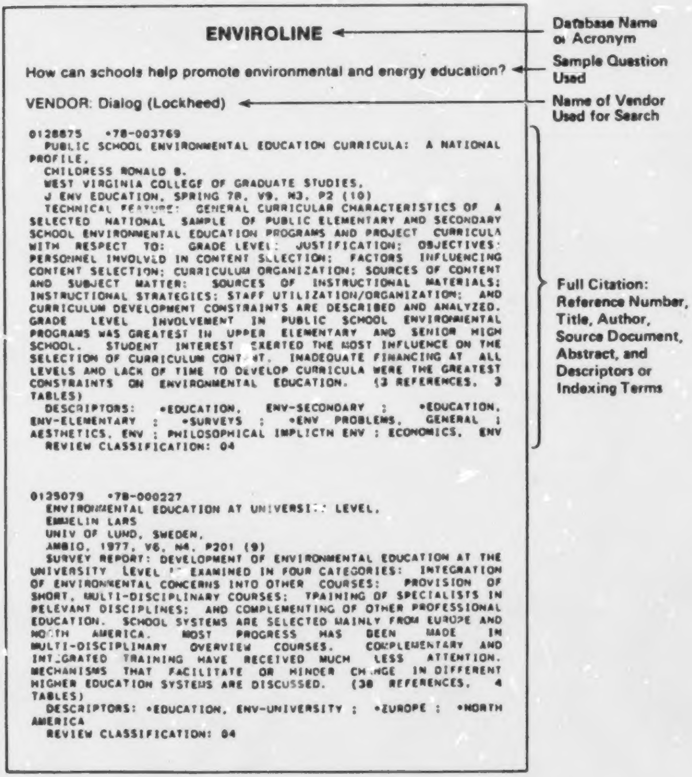
Intermediate Agencies

Many types of intermediate service agencies and educational resource centers stand ready to serve the personnel of local education agencies (school districts). Only three will be discussed here.

Research and Information Services for Education (R.I.S.E.) located in King of Prussia, Pennsylvania, is a statewide information center serving the needs of the Pennsylvania education community. R.I.S.E. responds to requests from educators by providing information drawn

SEARCH EXAMPLES

A series of computer searches was conducted to show the type of printout that can be received from the databases. One of seven questions was used to search each database. The following is an example of the search printout from one of the three principal commercial vendors.



ENVIROLINE

How can schools help promote environmental and energy education?

VENDOR: Dialog (Lockheed)

```
0128875   •78-003769
  PUBLIC SCHOOL ENVIRONMENTAL EDUCATION CURRICULA:  A NATIONAL
PROFILE.
  CHILDRESS RONALD B.
  WEST VIRGINIA COLLEGE OF GRADUATE STUDIES.
  J ENV EDUCATION, SPRING 78, V9, N3, P2 (10)
  TECHNICAL FEATURE:  GENERAL CURRICULAR CHARACTERISTICS OF  A
SELECTED  NATIONAL  SAMPLE  OF PUBLIC ELEMENTARY AND SECONDARY
SCHOOL ENVIRONMENTAL EDUCATION PROGRAMS AND PROJECT  CURRICULA
WITH  RESPECT  TO:   GRADE LEVEL:  JUSTIFICATION:  OBJECTIVES:
PERSONNEL INVOLVED IN CONTENT SELECTION:  FACTORS  INFLUENCING
CONTENT SELECTION: CURRICULUM ORGANIZATION: SOURCES OF CONTENT
AND  SUBJECT  MATTER:  SOURCES  OF  INSTRUCTIONAL  MATERIALS:
INSTRUCTIONAL STRATEGICS: STAFF UTILIZATION/ORGANIZATION:  AND
CURRICULUM DEVELOPMENT CONSTRAINTS ARE DESCRIBED AND ANALYZED.
GRADE   LEVEL   INVOLVEMENT   IN   PUBLIC   SCHOOL   ENVIRONMENTAL
PROGRAMS WAS GREATEST IN  UPPER  ELEMENTARY  AND  SENIOR  HIGH
SCHOOL.  STUDENT  INTEREST  EXERTED THE MOST INFLUENCE ON THE
SELECTION OF CURRICULUM CONTENT.  INADEQUATE FINANCING AT  ALL
LEVELS AND LACK OF TIME TO DEVELOP CURRICULA WERE THE GREATEST
CONSTRAINTS  ON  ENVIRONMENTAL  EDUCATION.   (3 REFERENCES,  3
TABLES)
  DESCRIPTORS:  •EDUCATION,  ENV-SECONDARY  ;  •EDUCATION,
ENV-ELEMENTARY  ;  •SURVEYS  ;  •ENV  PROBLEMS,  GENERAL  ;
AESTHETICS, ENV ; PHILOSOPHICAL IMPLICTN ENV ; ECONOMICS,  ENV
  REVIEW CLASSIFICATION: 04


0125079   •78-000227
  ENVIRONMENTAL EDUCATION AT UNIVERSITY LEVEL.
  EMMELIN LARS
  UNIV OF LUND, SWEDEN,
  AMBIO, 1977, V6, N4, P201 (9)
  SURVEY REPORT: DEVELOPMENT OF ENVIRONMENTAL EDUCATION AT THE
UNIVERSITY  LEVEL IS EXAMINED IN FOUR CATEGORIES:  INTEGRATION
OF ENVIRONMENTAL CONCERNS INTO OTHER  COURSES:   PROVISION  OF
SHORT, MULTI-DISCIPLINARY COURSES:  TRAINING OF SPECIALISTS IN
RELEVANT DISCIPLINES:  AND COMPLEMENTING OF OTHER PROFESSIONAL
EDUCATION.  SCHOOL SYSTEMS ARE SELECTED MAINLY FROM EUROPE AND
NORTH   AMERICA.   MOST   PROGRESS   HAS   BEEN   MADE   IN
MULTI-DISCIPLINARY   OVERVIEW   COURSES.   COMPLEMENTARY  AND
INTEGRATED  TRAINING  HAVE  RECEIVED  MUCH  LESS  ATTENTION.
MECHANISMS  THAT  FACILITATE  OR  HINDER  CHANGE  IN DIFFERENT
HIGHER EDUCATION SYSTEMS ARE DISCUSSED.   (38  REFERENCES,   4
TABLES)
  DESCRIPTORS: •EDUCATION, ENV-UNIVERSITY ;  •EUROPE :  •NORTH
AMERICA
  REVIEW CLASSIFICATION: 04
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Database Name or Acronym

Sample Question Used

Name of Vendor Used for Search

Full Citation: Reference Number, Title, Author, Source Document, Abstract, and Descriptors or Indexing Terms

Figure 2c

from national, state, regional, and local resources. In addition, technical assistance is provided to local agencies upon request, to aid them in adopting exemplary programs. Project R.I.S.E. is primarily federally funded and operates under the joint sponsorship of the Montgomery County Intermediate Unit and the Pennsylvania Department of Education.

HOW TO INTERPRET DATABASE SHEETS

ACRONYM:	Used because databases often have long and descriptive titles.
NAME OF DATA BASE:	Full Name
MAJOR AREA(S):	Broad category of information included in the database.
SUBJECTS COVERED:	More detailed listing of the types of information included in the database.
SIZE OF DATA BASE:	Number of records to date accessible through computer searching.
DATE ESTABLISHED:	Year database founded; may include materials prior to this date (usually five years earlier).
PUBLICATIONS/ PRINT JOURNALS:	Printed (or hard copy) publication(s) explaining or supplementing the database.
UPDATE FREQUENCY:	How often new information is added.
THESAURUS/SEARCH AIDS:	Any guides available to facilitate search of the database.
TYPES OF SOURCE DOCUMENTS:	Kinds of documents or materials from which information included in the database is found.
FORMS OF RETRIEVABLE INFORMATION:	Various formats in which information is retrieved: title only, title and author, descriptors, abstracts, long or short citations, etc.
DOCUMENT COPIES AVAILABLE:	Whether the original source documents are available, in what form, and where to order.
REMARKS:	Any other useful information.
INFORMATION CONTACT:	Person representing the organization responsible for building the database; someone who can tell you about how to search it, what is in it, how to access it, etc.
DATE VERIFIED:	Date information was checked with database supplier.
SYSTEMS/VENDORS:	Commercial organization that makes the database available online.
CONDITIONS:	Circumstances under which database can be accessed.

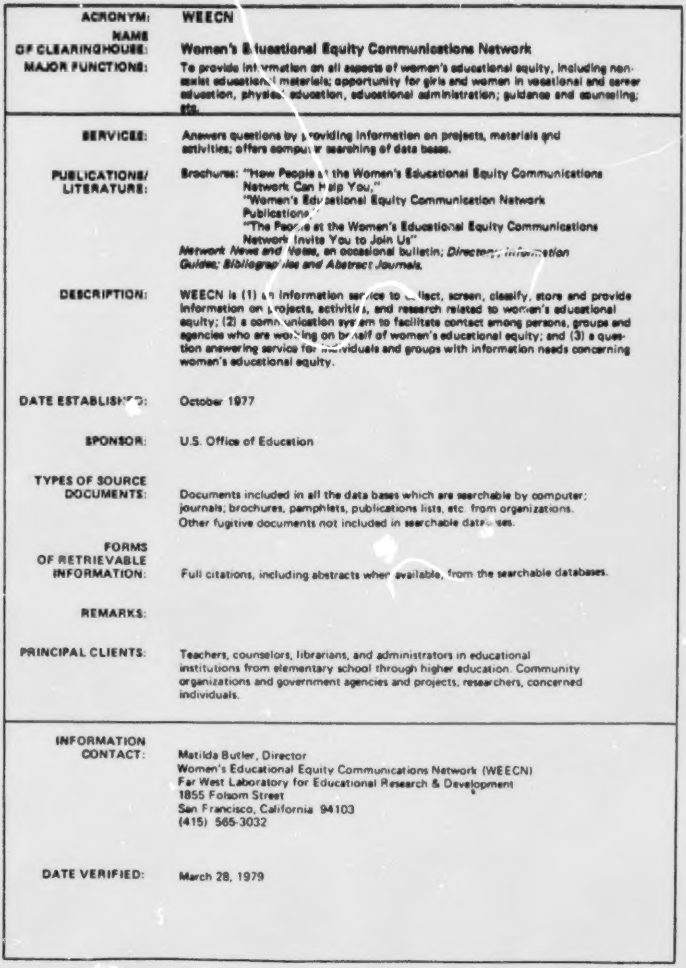
Figure 2d

One service of R.I.S.E is the preparation and dissemination of literature searches. Each search consists of a collection of materials prepared in response to a specific request from an educator. Thus, a literature search is a completely responsive service, geared to the needs of the user. It contains a bibliography and those articles and abstracts cited in the bibliography.

ACRONYM:	NICSEM/NIMIS I
NAME OF DATA BASE:	NATIONAL INFORMATION CENTER FOR SPECIAL EDUCATION MATERIALS/NATIONAL INSTRUCTIONAL MATERIALS INFORMATION SYSTEM I
MAJOR AREA(S):	Child use materials for special education
SUBJECTS COVERED:	Print and non-print materials such as books, guides and manuals, kits, films, video and audio cassettes, filmstrips, games, toys, transparencies, etc. Intended for use in schools and institutions for preschool children to young adults with handicaps in learning, including: visual, hearing, speech and language impairments, mental retardation, behavior disorders, learning and physical disabilities.
SIZE OF DATA BASE:	37,000+
DATE ESTABLISHED:	1974
PUBLICATIONS/ PRINT JOURNALS:	Master catalog and indexes cross-referenced by handicapping condition available in bookform and microfiche
UPDATE FREQUENCY:	Unscheduled basis
THESAURUS/SEARCH AIDS:	None at this time
TYPES OF SOURCE DOCUMENTS:	Publishers and producers
FORMS OF RETRIEVABLE INFORMATION:	Computer printout with explanation of type of material, bibliographic data, price, etc.
DOCUMENT COPIES AVAILABLE:	Materials can be ordered from publishers, producers or state/local learning resource centers.
REMARKS:	Contact NICSEM or local State Education Agencies for further information.
INFORMATION CONTACT:	Information Specialist NICSEM University of Southern California University Park Los Angeles, California 90007 (800) 421-8711; California residents call (213) 741-5899
DATE VERIFIED:	April 3, 1979
SYSTEMS/VENDORS:	BRS; DIALOG (LOCKHEED)
CONDITIONS:	Online searching services provided through NICSEM

Figure 2e

During the years since its inception in 1966, R.I.S.E. has completed more than 1,000 literature searches on a wide variety of subjects. A catalog containing a subject listing of these searches is available from R.I.S.E. Whether an educator is concerned about budgeting, team teaching, science curriculum, kindergarten, or declining enrollment, information will be found on these and a variety of other topics in the collection of R.I.S.E. searches. Periodically, these searches are re-



ACRONYM:	**WEECN**
NAME OF CLEARINGHOUSE:	**Women's Educational Equity Communications Network**
MAJOR FUNCTIONS:	To provide information on all aspects of women's educational equity, including non-sexist educational materials; opportunity for girls and women in vocational and career education, physical education, educational administration; guidance and counseling; etc.
SERVICES:	Answers questions by providing information on projects, materials and activities; offers computer searching of data bases.
PUBLICATIONS/ LITERATURE:	Brochures: "How People at the Women's Educational Equity Communications Network Can Help You," "Women's Educational Equity Communication Network Publications," "The People at the Women's Educational Equity Communications Network Invite You to Join Us" *Network News and Notes*, an occasional bulletin; *Directory; Information Guides; Bibliographies and Abstract Journals.*
DESCRIPTION:	WEECN is (1) an information service to collect, screen, classify, store and provide information on projects, activities, and research related to women's educational equity; (2) a communication system to facilitate contact among persons, groups and agencies who are working on behalf of women's educational equity; and (3) a question answering service for individuals and groups with information needs concerning women's educational equity.
DATE ESTABLISHED:	October 1977
SPONSOR:	U.S. Office of Education
TYPES OF SOURCE DOCUMENTS:	Documents included in all the data bases which are searchable by computer; journals; brochures, pamphlets, publications lists, etc. from organizations. Other fugitive documents not included in searchable databases.
FORMS OF RETRIEVABLE INFORMATION:	Full citations, including abstracts when available, from the searchable databases.
REMARKS:	
PRINCIPAL CLIENTS:	Teachers, counselors, librarians, and administrators in educational institutions from elementary school through higher education. Community organizations and government agencies and projects; researchers, concerned individuals.
INFORMATION CONTACT:	Matilda Butler, Director Women's Educational Equity Communications Network (WEECN) Far West Laboratory for Educational Research & Development 1855 Folsom Street San Francisco, California 94103 (415) 565-3032
DATE VERIFIED:	March 28, 1979

Figure 2

viewed and brought up-to-date to reflect current literature. Duplicates of all searches are kept at the R.I.S.E. center.

A wide range of educational resources is available through the R.I.S.E. center. Among these are the following:

- Complete file of R.I.S.E. literature searches.
- Educational Resources Information Center (ERIC), Current Index to Journals in Education (CIJE), and complete ERIC microfiche collection.
- 400 current subscriptions to educational periodicals.
- Online computer terminal for searching some 50 databases.
- Book and document collection.
- Selected curriculum materials.
- National indexing services.
- Basic educational reference tools.
- Materials from validated projects.

R.I.S.E. serves as the Pennsylvania State Facilitator for the U.S. Office of Education's National Diffusion Network. In this capacity R.I.S.E. helps local districts become aware of exemplary projects from across the state and nation. These projects have been evaluated and found successful as models worthy of being copied by other districts with similar needs. Sample materials from projects are available on loan from R.I.S.E. In addition, interested districts may receive technical assistance from R.I.S.E. in the form of arrangements for site visits, conferences, and inservice training.

R.I.S.E. offers many other services to educators, not just within Pennsylvania but anywhere else as well. It is one of several "full-service" agencies that are prepared to provide information at cost to any agency anywhere, that requests such services.[6]

On the other hand, the Educational Materials Laboratory (EML) is the central professional library serving the Montgomery County (Maryland) Public Schools. The EML loans materials for professional development, provides inservice course materials, handles ready-reference and in-depth requests, prepares bibliographies, and furnishes article reprints. Since 1973 it has offered online retrieval for users—who include only employees of the county school system, patrons of the county public library system, students of the local community college, and county high school students. No searhe are conducted for "outsiders."[7]

A third type of service agency may be found in the regional educational laboratories as part of the Research and Development Exchange (RD_x) operation or as Regional Service Programs; both types are funded by the National Institute of Education. These projects, which now provide regional services to state education agencies in many parts of the country, are developing some interesting noncomputerized databases to fit the specific needs of the states they serve. The Resource and Referral Service of the RD_x system issues inexpensive "mini-lists" containing focused information on a variety of topics. (See sample on the following pages.) It is important to note, however, that given the level of funding support available to these regional programs, they currently cannot serve all individual clients in their regions but must in general concentrate their major service delivery to state and intermediate agencies, to very large school districts, and to the affiliates of key educational associations and organizations.

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[6] The author is indebted to Richard Brickley, director of R.I.S.E., for some of the ideas expressed in this paper.

Linking Agents

In the past decade the educational dissemination community has begun to focus its efforts on the role of linking agents — problem-solvers who have been trained to help clients working in schools, resource centers, state agencies, and other educational settings assess their needs, examine and select among available alternatives, undergo training, and adopt or adapt locally one or more new options that were originally developed at comparable learning sites elsewhere.

The National Diffusion Network (NDN) is perhaps the most successful and most firmly established of these experimental systems intended to close the gap between research-based, validated knowledge (and products) and classroom practice.[8] (See figures 3a, 3b, and 3c.)

What is critical about the linker's role—played by both facilitators and developers in the NDN, by information specialists employed in educational service agencies, by some field representatives of the commercial educational publishing industry, and by many others—is that each linking agent must build continuing trust relationships with building level personnel in education. Each must cross organizational boundaries as part of the work assignment. Each is a process helper and sometimes a "product pusher." Each is, above all, a potential problem solver for intended clients.

It is the thesis of this paper that, without these linkers, even the richest and most up-to-date databases will remain underutilized.[9]

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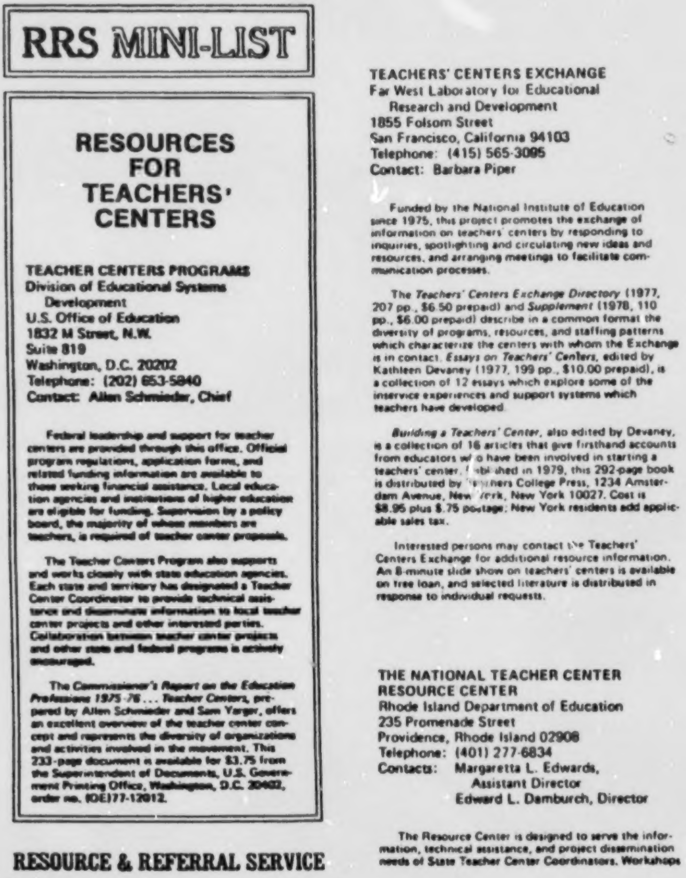
[7] For details, see "Online Information Retrieval in a Local Education Agency" in *School Media Quarterly* (Fall 1977).

[8] A detailed description of NDN may be found in *NDN: A Success Story* produced for the U. S. Office of Education by the Far West Laboratory. The publication is available from LEA Associates, Concord, New Hampshire.

[9] For some of the underlying research on this topic, see *Synthesis of Five Recent Studies* (Revised Version), Far West Laboratory (1978).



RRS MINI-LIST

RESOURCES FOR TEACHERS' CENTERS

TEACHER CENTERS PROGRAMS
Division of Educational Systems
Development
U.S. Office of Education
1832 M Street, N.W.
Suite 819
Washington, D.C. 20202
Telephone: (202) 653-5840
Contact: Allen Schmieder, Chief

Federal leadership and support for teacher centers are provided through this office. Official program regulations, application forms, and related funding information are available to those seeking financial assistance. Local education agencies and institutions of higher education are eligible for funding. Supervision by a policy board, the majority of whose members are teachers, is required of teacher center proposals.

The Teacher Centers Program also supports and works closely with state education agencies. Each state and territory has designated a Teacher Center Coordinator to provide technical assistance and disseminate information to local teacher center projects and other interested parties. Collaboration between teacher center projects and other state and federal programs is actively encouraged.

The *Commissioner's Report on the Education Professions 1975-76 . . . Teacher Centers*, prepared by Allen Schmieder and Sam Yarger, offers an excellent overview of the teacher center concept and represents the diversity of organizations and activities involved in the movement. This 233-page document is available for $3.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, order no. (OE)77-12012.

TEACHERS' CENTERS EXCHANGE
Far West Laboratory for Educational
Research and Development
1855 Folsom Street
San Francisco, California 94103
Telephone: (415) 565-3095
Contact: Barbara Piper

Funded by the National Institute of Education since 1975, this project promotes the exchange of information on teachers' centers by responding to inquiries, spotlighting and circulating new ideas and resources, and arranging meetings to facilitate communication processes.

The *Teachers' Centers Exchange Directory* (1977, 207 pp., $6.50 prepaid) and *Supplement* (1978, 110 pp., $6.00 prepaid) describe in a common format the diversity of programs, resources, and staffing patterns which characterize the centers with whom the Exchange is in contact. *Essays on Teachers' Centers*, edited by Kathleen Devaney (1977, 199 pp., $10.00 prepaid), is a collection of 12 essays which explore some of the inservice experiences and support systems which teachers have developed.

Building a Teachers' Center, also edited by Devaney, is a collection of 16 articles that give firsthand accounts from educators who have been involved in starting a teachers' center. Published in 1979, this 292-page book is distributed by Teachers College Press, 1234 Amsterdam Avenue, New York, New York 10027. Cost is $8.95 plus $.75 postage; New York residents add applicable sales tax.

Interested persons may contact the Teachers' Centers Exchange for additional resource information. An 8-minute slide show on teachers' centers is available on free loan, and selected literature is distributed in response to individual requests.

THE NATIONAL TEACHER CENTER RESOURCE CENTER
Rhode Island Department of Education
235 Promenade Street
Providence, Rhode Island 02908
Telephone: (401) 277-6834
Contacts: Margaretta L. Edwards,
Assistant Director
Edward L. Damburch, Director

The Resource Center is designed to serve the information, technical assistance, and project dissemination needs of State Teacher Center Coordinators. Workshops

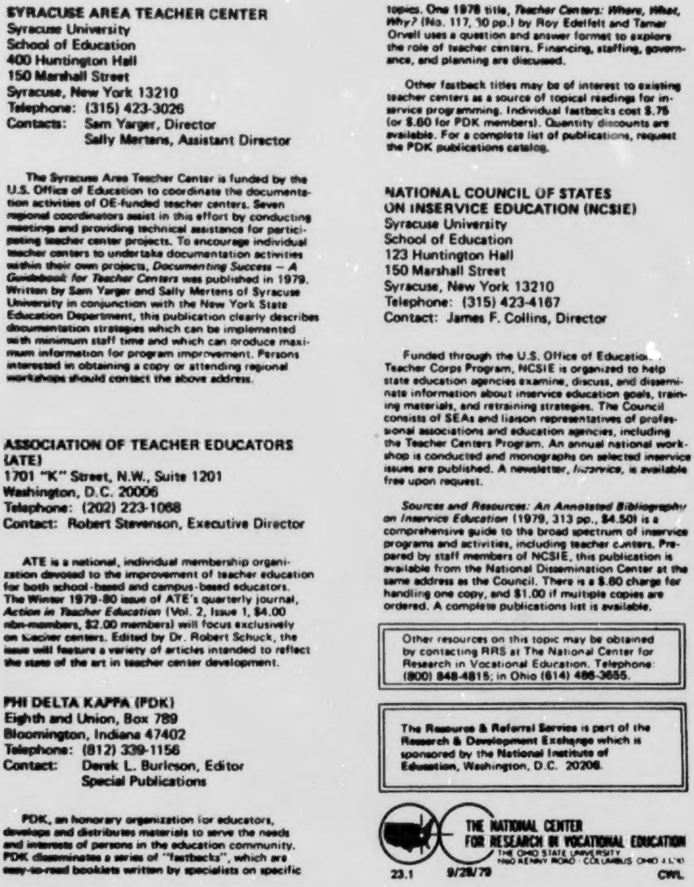
RESOURCE & REFERRAL SERVICE

Figure 3a

A View of the Future

American Educator in 1979 reported to its readers on "Videodiscs: Revolution in Classroom Technology," pointing out that "one company's discs do not fit another's players." Yet very few U.S. school districts now own or use videocassette recorders and tapes. Very few have made full use of computer communications and computerized databases :md in an age when, according to the *Bulletin of the American Society for Information Science* (October 1979), information occupations account for more than 40 percent of the work force. Schools continue to operate in accordance with comfortable and trusted routines at the very moment when politics and technology are rapidly altering the ways in which information is produced, stored, communicated, processed, and used.

In July 1979, Christopher Dede, president of the education section of the World Future Society, published a paper called "Educational Technology: The Next Ten Years." In it, he suggested:



SYRACUSE AREA TEACHER CENTER
Syracuse University
School of Education
400 Huntington Hall
150 Marshall Street
Syracuse, New York 13210
Telephone: (315) 423-3026
Contacts: Sam Yarger, Director
Sally Mertens, Assistant Director

The Syracuse Area Teacher Center is funded by the U.S. Office of Education to coordinate the documentation activities of OE-funded teacher centers. Seven regional coordinators assist in this effort by conducting meetings and providing technical assistance for participating teacher center projects. To encourage individual teacher centers to undertake documentation activities within their own projects, *Documenting Success — A Guidebook for Teacher Centers* was published in 1979. Written by Sam Yarger and Sally Mertens of Syracuse University in conjunction with the New York State Education Department, this publication clearly describes documentation strategies which can be implemented with minimum staff time and which can produce maximum information for program improvement. Persons interested in obtaining a copy or attending regional workshops should contact the above address.

ASSOCIATION OF TEACHER EDUCATORS (ATE)
1701 "K" Street, N.W., Suite 1201
Washington, D.C. 20006
Telephone: (202) 223-1068
Contact: Robert Stevenson, Executive Director

ATE is a national, individual membership organization devoted to the improvement of teacher education for both school-based and campus-based educators. The Winter 1979-80 issue of ATE's quarterly journal, *Action in Teacher Education* (Vol. 2, Issue 1, $4.00 non-members, $2.00 members) will focus exclusively on teacher centers. Edited by Dr. Robert Schuck, the issue will feature a variety of articles intended to reflect the state of the art in teacher center development.

PHI DELTA KAPPA (PDK)
Eighth and Union, Box 789
Bloomington, Indiana 47402
Telephone: (812) 339-1156
Contact: Derek L. Burleson, Editor
Special Publications

PDK, an honorary organization for educators, develops and distributes materials to serve the needs and interests of persons in the education community. PDK disseminates a series of "fastbacks", which are easy-to-read booklets written by specialists on specific topics. One 1978 title, *Teacher Centers: Where, What, Why?* (No. 117, 30 pp.) by Roy Edelfelt and Tamar Orvell uses a question and answer format to explore the role of teacher centers. Financing, staffing, governance, and planning are discussed.

Other fastback titles may be of interest to existing teacher centers as a source of topical readings for inservice programming. Individual fastbacks cost $.75 (or $.60 for PDK members). Quantity discounts are available. For a complete list of publications, request the PDK publications catalog.

NATIONAL COUNCIL OF STATES ON INSERVICE EDUCATION (NCSIE)
Syracuse University
School of Education
123 Huntington Hall
150 Marshall Street
Syracuse, New York 13210
Telephone: (315) 423-4167
Contact: James F. Collins, Director

Funded through the U.S. Office of Education's Teacher Corps Program, NCSIE is organized to help state education agencies examine, discuss, and disseminate information about inservice education goals, training materials, and retraining strategies. The Council consists of SEAs and liaison representatives of professional associations and education agencies, including the Teacher Centers Program. An annual national workshop is conducted and monographs on selected inservice issues are published. A newsletter, *Inservice*, is available free upon request.

Sources and Resources: An Annotated Bibliography on Inservice Education (1979, 313 pp., $4.50) is a comprehensive guide to the broad spectrum of inservice programs and activities, including teacher centers. Prepared by staff members of NCSIE, this publication is available from the National Dissemination Center at the same address as the Council. There is a $.60 charge for handling one copy, and $1.00 if multiple copies are ordered. A complete publications list is available.

Other resources on this topic may be obtained by contacting RRS at The National Center for Research in Vocational Education. Telephone: (800) 848-4815; in Ohio (614) 486-3655.

The Resource & Referral Service is part of the Research & Development Exchange which is sponsored by the National Institute of Education, Washington, D.C. 20208.

THE NATIONAL CENTER
FOR RESEARCH IN VOCATIONAL EDUCATION
THE OHIO STATE UNIVERSITY
1960 KENNY ROAD · COLUMBUS OHIO 43210

23.1 9/28/79 CWL

Figure 3b

> Realistically, in ten years, we in formal education will have one-half of the fiscal resources that we have today: one-half of the salaries, the facilities, the books, the equipment, the maintenance, transportation, and the administrative resources. One-half real dollar loss in ten years assumes an average erosion of seven percent per year; that is, losses from inflation, salary hikes, and recession will overbalance any gains from tax monies and other sources by about seven percent per year over the next ten years. . . .
>
> A second reason for alarm is that we seem to have reached the maximum percentage of their income that people are willing to spend for education. Over time, the "piece of pie" that we've been able to claim from people's incomes has crept up and up and up — but now, clients are saying "no more." Taxpayers are clearly indicating "whether the educational system works or not, this fraction of my money is the maximum that I'm willing to spend; education will just have to survive on it.". . .
>
> I know of no one who has developed a system for improving human teachers such that, in ten years, they can be three times as effective at half the cost. *For what machines can do well*, people are not competitive economically. So our labor intensive position in education has caused us steadily to consume more and more of the consumer dollar, just as have all the other labor intensive industries; and we have finally reached the limit.

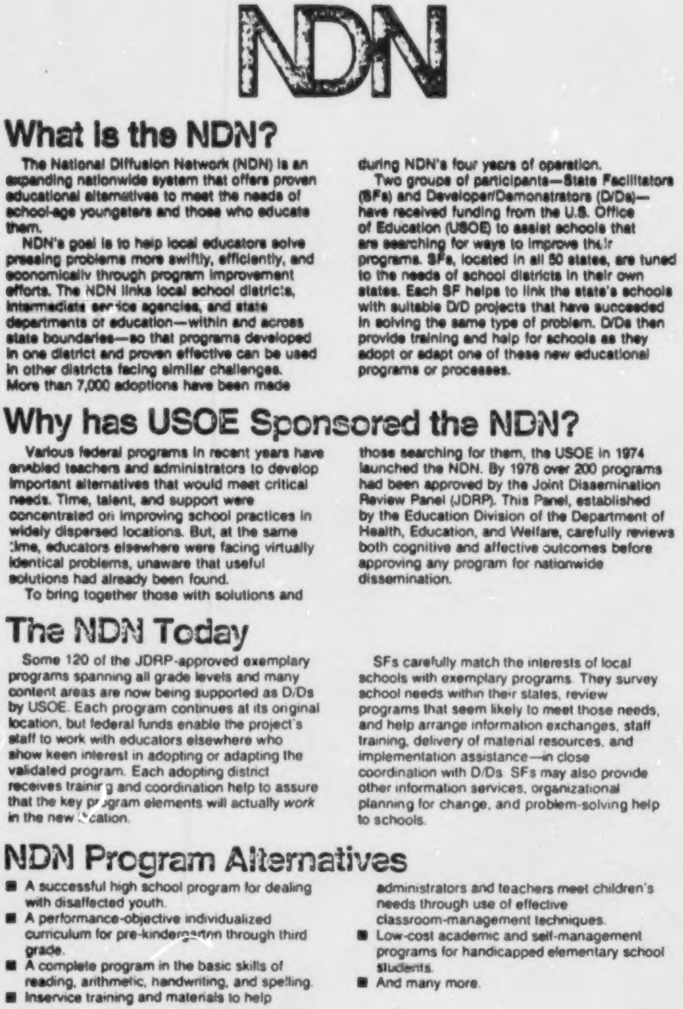
At the same time we must recognize that the amount of raw information in the world now doubles in less than a decade, that nearly half the gross national product is generated by information-related activities, and that—more and more—information is being created and stored *only* in electronic or audiovisual forms—without print equivalents.

Some Implications for the Classroom Teacher

A reader of this paper will have taken its content in gulps. Swift glances enable each of us to infer the meaning of entire passages. But Medieval readers went slowly, word for word, absorbing everything in their capacious memories. They could recite lengthy epics, for it was a time when people got their ideas orally.

Today we move much more rapidly. We get our ideas from television and radio and cassettes and films and reading. We hear of the development of incredible new systems, like an interactive information system called Domestic Information Display System (DIDS),[10] which makes working with reams of statistics from dozens of government agencies as easy as typing a few questions on a typewriter. How many of today's teachers or school administrators now know about this data bank or can perceive how it might be useful in the learning process?

What we have suggested thus far is that the technology has arrived (and is becoming less expensive each year — witness the hand-held calculator) and that the potential for use is large. Moreover, many databases exist — both computerized and noncomputerized — (the latter in the form of catalogs, resource centers, and print and audiovisual collections). But in most schools only books, filmstrips, audio cassette tapes, and films are now being used widely.



NDN

What is the NDN?

The National Diffusion Network (NDN) is an expanding nationwide system that offers proven educational alternatives to meet the needs of school-age youngsters and those who educate them.

NDN's goal is to help local educators solve pressing problems more swiftly, efficiently, and economically through program improvement efforts. The NDN links local school districts, intermediate service agencies, and state departments of education—within and across state boundaries—so that programs developed in one district and proven effective can be used in other districts facing similar challenges. More than 7,000 adoptions have been made during NDN's four years of operation.

Two groups of participants—State Facilitators (SFs) and Developer/Demonstrators (D/Ds)—have received funding from the U.S. Office of Education (USOE) to assist schools that are searching for ways to improve their programs. SFs, located in all 50 states, are tuned to the needs of school districts in their own states. Each SF helps to link the state's schools with suitable D/D projects that have succeeded in solving the same type of problem. D/Ds then provide training and help for schools as they adopt or adapt one of these new educational programs or processes.

Why has USOE Sponsored the NDN?

Various federal programs in recent years have enabled teachers and administrators to develop important alternatives that would meet critical needs. Time, talent, and support were concentrated on improving school practices in widely dispersed locations. But, at the same time, educators elsewhere were facing virtually identical problems, unaware that useful solutions had already been found.

To bring together those with solutions and those searching for them, the USOE in 1974 launched the NDN. By 1978 over 200 programs had been approved by the Joint Dissemination Review Panel (JDRP). This Panel, established by the Education Division of the Department of Health, Education, and Welfare, carefully reviews both cognitive and affective outcomes before approving any program for nationwide dissemination.

The NDN Today

Some 120 of the JDRP-approved exemplary programs spanning all grade levels and many content areas are now being supported as D/Ds by USOE. Each program continues at its original location, but federal funds enable the project's staff to work with educators elsewhere who show keen interest in adopting or adapting the validated program. Each adopting district receives training and coordination help to assure that the key program elements will actually *work* in the new location.

SFs carefully match the interests of local schools with exemplary programs. They survey school needs within their states, review programs that seem likely to meet those needs, and help arrange information exchanges, staff training, delivery of material resources, and implementation assistance—in close coordination with D/Ds. SFs may also provide other information services, organizational planning for change, and problem-solving help to schools.

NDN Program Alternatives

- A successful high school program for dealing with disaffected youth.
- A performance-objective individualized curriculum for pre-kindergarten through third grade.
- A complete program in the basic skills of reading, arithmetic, handwriting, and spelling.
- Inservice training and materials to help administrators and teachers meet children's needs through use of effective classroom-management techniques.
- Low-cost academic and self-management programs for handicapped elementary school students.
- And many more.

Figure 3c

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[10] For more information, write DIDS Secretariat, Department of Commerce, Washington, DC.

[11] See *Alternative Approaches to Analyzing Educational Dissemination and Linkage Roles and Functions* by P. D. Hood & C. S. Cates, Far West Laboratory, 1978.

Those educators who do find their way to intermediate service agencies, where access to databases is readily available, simply do not care where data comes from when they request it. They need help today, and a trained human linker can provide it. They do not want a lengthy printout of everything known about, for example, basic skills. What they do want is usable, available options that can be touched, sampled, installed, and evaluated with their own pupils. They don't want esoteric research and they don't want junk. They are not academic-based researchers. They are busy, sometimes burned-out teachers.

So we must find *not* more databases, but more *responsive* human linkers[11] who can make shrewd judgments about what's to be found in all those databases and then translate that information into building-level options suited to the requester's real needs and interests and capabilities.

Right now in many school buildings, that *potential* linking agent is employed — the school media specialist, formerly known as the school librarian. So there's a linker now employed at the building level all across the nation, a member of the same teacher organization as the teaching personnel for whom all that data is intended — in short, a trusted peer.

Now we must link *that* person with all those systems out there — the technology, the databases, the dissemination networks. But it will be a massive job, for we will need to help change behavior patterns and attitudes. Right now, like teachers, school media specialists are probably attending only to data congruent with their predispositions. And new library-school graduates, who may have first-hand experience with technology, cannot be hired due to budgetary restraints.

What we face is a major awareness effort — to inform thousands of school media specialists about what's out there, outside their buildings, and to encourage them to experiment with information retrieval systems that can provide real-world help to their teaching colleagues. Some states[12] are further advanced than others; perhaps we must begin with the most sophisticated, even at the obvious risk of seeing the "rich" get richer while those with fewer information resources continue to lag behind.

But our goal should be, over time, to assure that virtually *every* classroom teacher becomes able and willing to meet day-to-day educational challenges with the information products and services already being offered by more than a million information professionals — information scientists, communication scientists, computer scientists, library scientists, and educational linking agents.

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[12] See *The State of the States*, Far West Laboratory, 1979.

CAI and Training Needs

Judith B. Edwards, Ph.D., Northwest Regional Educational Laboratory, Portland, Oregon

IMPROVEMENTS IN THE EDUCATIONAL COMPUTING PICTURE

During the last ten years a quiet revolution has been going on in education as computer technology has provided new tools and resources to enhance and enrich the learning process. While a 1970 study (*Darby, Korotkin and Romashko, 1970*) showed 34 percent of the nation's schools using computers to aid in administration and instruction, five years later (*Bukoski and Korotkin, 1975*) that percentage had nearly doubled to 58 percent. This growth rate has continued to be steady and stable during the decade of the 70's.

Within the six states in the region served by Northwest Regional Educational Laboratory, 66 percent of the 896 school districts are currently using computers in education, and 96 percent of the districts expect to be using computers by 1982 to aid in administration and instruction (*Edwards, 1979*).

Now a new revolution is under way—one which promises to accelerate the rate at which schools acquire computers. The impetus for growth is the microcomputer. Beginning with the introduction of the $595 PET microcomputer in the summer of 1977, schools may now choose from an array of more than a dozen inexpensive (under $1,000) microcomputers suitable for school use in administration or instruction. These small computers are less expensive than are most of the terminals used to connect to a large computer for time-shared computing, yet the microcomputer has most of the capabilities of the large computer.

It is significant to note that many of the programs developed for larger computers will run on microcomputers with little modification, and microcomputer programs are upwardly adaptable to larger systems. Thus, the burgeoning of microcomputers in the educational marketplace not only increases availability of hardware but adds a new dimension to the availability and utility of instructional and administrative programs.

Although the potential of the computer for improving the quality and effectiveness of education has been repeatedly demonstrated, many educational institutions have not yet taken significant advantage of its many applications. Through countless programs of research, development and application, judicious use of the computer has been shown to be capable of:

- Altering the style of teacher-pupil interaction to give more personalized attention to individual learner needs
- Allowing pupil exploration of concepts (e.g., through interactive simulations of complex social, physical or biological phenomena) which are unavailable through traditional delivery mechanisms
- Providing efficient and effective remediation in the basic skills, a major problem across the country
- Providing instructional and administrative decision makers with the data and tools to support informed and cost effective decisions
- Providing a means for individualized, independent learning, as the basis for lifelong learning in a society where the rate of change is accelerating
- Assuming routinized tasks such as record keeping and reporting, providing drill and practice, testing, performing complex or voluminous calculations and providing diagnosis and prescription.

Obstacles to the Use of Computers in Education

During the sixties, the Computer Instruction Network, an ESEA Title III Project in Oregon, was running a converted bread truck, with an IBM computer installed inside, on regularly scheduled visits to rural and isolated Oregon communities. The broad objective in the Project was to provide an opportunity for teachers and students—particularly in non-urban settings—to become computer literate and to get a sample of how they could use the computer to enhance learning. The Oregon network also loaned smaller computers to schools for a few weeks at a time. During the course of the Project, many major obstacles became clear. The major difficulties which had to be grappled with to achieve even a part of the Project's goal were:

1. The high cost of computing hardware and software
2. An urgent and continuing need for teacher training, and an unwillingness or inability on the part of teacher-training institutions to address that need
3. Lack of adequate instructional and administrative software and materials related to computers.

The work of training and of software development were further hampered by the overall lack of evaluation data on CAI theories, methods, effectiveness, and costs.

Project personnel found themselves conducting almost continuous teacher-training workshops and classes; developing software, instructional programs and materials (with an assist from an NSF grant); and treating the three types of computers they used as three separate and totally unique tools with no possible sharing of programs or materials across computers. Finding little data on effect and effectiveness, the Project contracted for ongoing evaluation of their own work—only to find a lack of available evaluation techniques appropriate to new ways of learning and teaching.

When funding for the Computer Instruction Network ended, the computers were placed permanently in schools, where they are still used daily. Later, a long-term NSF grant provided support for the Oregon Council on Computer Education, which tackled the teacher training and materials development problem and started a highly visible and successful publication called *The Oregon Computing Teacher*. Although the grant's term has expired, the publication is continuing with a nationwide subscription base. A nucleus of trained teachers has successfully instituted instructional use of computers in every part of the state. The federal "seed money" has done a great deal to establish educational computing in Oregon, which is growing and positively affecting pre-college education in every area.

There is a marked difference, however, between educational computing today and that of the sixties; it is: the Computer Instruction Network's "bread truck" computer cost $30,000, while today a microcomputer system with even more capability is small enough to fit under the glove compartment in your car and sells for about $3,000. The "small" computers in the 1960's cost $8,000; their equivalent today, again not much bigger than a bread box, sells for under $800. This explosion of eminently affordable microcomputers in the last three years (well over a dozen brands are currently on the market) is having a decided effect on current instructional applications of computers and on the future plans schools are now envisioning for their use of computers.

Fifteen years ago, then, the three major obstacles to use of the computer in education were: cost, lack of teacher training, and lack of available software. Though to a lesser extent, the same obstacles exist today. Because of the recent dramatic decreases in hardware cost, the cost problem appears to be substantially on its way to solution. The problems of software availability and teacher training, however, are still with us. In fact, as the microcomputer becomes a ubiquitous fixture in the classroom, these two problems are ever more urgently in need of a solution.

Solutions

In the previously-cited 1979 survey (*Edwards, 1979*), solutions to the problems in educational computing were addressed from the perspective of what needs teachers viewed as most important to be filled. It was found that teachers with at least some exposure to computers had the highest need for information about the following topics:

- How to use computers in my teaching area (69.? percent)
- How to expand computer use in my school (63.5 percent)
- Where to find help in using computers in instruction (62.2 percent)
- Available computer systems, hardware, and software (59.4 percent).

In addition, respondents had a high need for assistance and support in the following areas:

- Expanding the school's computer program (58.3 percent)
- Integrating the computer into an instructional program or discipline (57.1 percent)
- Locating existing instructional applications and materials (56.4 percent)
- Developing computer literacy/science courses (55.1 percent).

It would appear, then, that teachers feel a need for "user support," access to quality software, and teacher training. One solution to the lack of software and need for user support is currently being implemented at Northwest Regional Educational Laboratory (NWREL), with National Institute of Education support: a clearinghouse is being established for precollege microcomputer instructional software, with a corollary user support and technical assistance function. The need for teacher training, however, is not as directly addressed by the clearinghouse, although planned user support includes introductory workshops for educational decision makers (teachers, administrators and policy makers).

Software Clearinghouse

The clearinghouse, called MicroSIFT (Microcomputer Software and Information For Teachers), is still in the early stages of becoming operational. It will review and test available programs and will publish those reviews. Topical monographs (e.g., *How to Select a Computer*) will be developed and broadly disseminated. Topical annotated bibliographies will also be made available. A regular newsletter will publish software reviews and will include news about computer activities in schools in the region. Additional user support will be provided by telephone and mail.

The primary focus of MicroSIFT, however, will be the documentation, packaging, and dissemination of a small number of instructional programs of very high quality. The clearinghouse will not distribute programs which are already commercially available, but instead will seek out software developed by organizations such as the Minnesota Educational Computing Consortium, individual school districts, regional consortia, and federal projects. The emphasis will be on quality rather than quantity.

It is very apparent, even in the early stage of operation, that such a clearinghouse must provide a great deal of user support and program maintenance.

Teacher Training

Preservice and inservice training of teachers and administrators is an urgent need that is only beginning to be directly addressed. As a first step in identifying the content of a teacher training program, the Elementary and Secondary Schools Subcommittee of the Association for Computing Machinery has formally developed curricular and teacher training guidelines for the integration of computing into the elementary and secondary schools of the country. "The task group saw the competencies needed by teachers at the school level as all belonging to one of three sets. The first set dealt with basic, universal computing competencies, those demanded by any school teacher, regardless of level or subject. The second set dealt with additional computing competencies needed only by the computing teacher, the teacher who must teach computing as a subject in its own right. The third set dealt with additional computing competencies which are needed by teachers other than the computing teacher, competencies which may be subject-specific (those needed by the art teacher may be different than those needed by the math teacher) (*Taylor, 1979*)."

The competencies identified for each of the three groups are excerpted from the task group's preliminary report (*Taylor, 1979) as follows:*

> Computing competencies needed by teachers
>
> As suggested above, there are three sets of computing competencies which must be defined for the integration of computing into the schools. The first includes those which *all* teachers must have, regardless of their level or discipline, even if that discipline is the teaching of computing itself. That set is dealt with in the first main subdivision below: '1.0 Computing competencies needed by all teachers.' The second set includes those needed only by the teacher of computing as a subject. That set will not be discussed in this paper, but in a separate one [1]. It should be noted however, that that second set presupposes and builds upon the set specified in 1.0 below. The third set includes additional competencies which pertain to using

computing to support or enhance subject instruction other than instruction in computing. (One may apply primarily to the art teacher; another to the reading teacher; a third to the physics teacher; and so on.) Any given teacher will require at least one of the competencies included in the third set but no one of them will be universally appropriate for all teachers. This third set is discussed in the second major subdivision below: '3.0 Subject-specific competencies needed by teachers.'

C1.0: Universal computing competencies needed by all teachers

There are a set of computing competencies which all school teachers should henceforth have if they are to improve their work by capitalizing on computing as an educative force. These universally required competencies relate to either or both of two simply-stated but far-reaching goals: (1) to *understand* computing and (2) to *use* computing. They can be stated partially in terms of competencies listed in ACM's 'Curriculum '78'' and partially in terms of different competencies, derivable from other sources. Together, those sources reflect the abundance of diverse work that has taken place in the past decade, relating computing to education.

In terms of these competencies, *every* teacher should:

C1.1 be able to write programs and subprograms that work correctly and are easily readable by others, and be familiar with how such programs and subprograms fit together into systems;

C1.2 know what general types of problems are amenable to computer solution and the various tools necessary for solving such problems, particularly in using computers in education;

C1.3 know what general types of problems are *not* currently amenable to computer solution and generally why not, particularly in using computers in education;

C1.4 be able to discuss, at the level of an intelligent layperson the history of computing, particularly as it relates to education;

C1.5 be able to identify and generally rate several alternate sources of best current information on computing as it relates to education;

C1.6 be able to discuss moral or human impact issues of computing as they relate to: (a) societal use of computers generally, and (b) educational use particularly.

The Task Group went on to identify additional (subject-specific) competencies which are needed by teachers other than the computing teacher:

C3.0: Subject-specific competencies needed by teachers

In addition to the set of universal competencies needed by all school teachers, there are additional competencies which teachers should have which vary from level to level and discipline to discipline. The definitions of these competencies spring entirely from the vast and highly diverse body of experience with using computing in education which have been built over the last decade. Sources representing some of this work are listed in the bibliography. The competencies can be stated generally, irrespective of the teacher's eventual level or subject; the transmittal through topics, though, will vary considerably, depending on both.

In terms of these subject-specific competencies, the teacher should:

C3.1 be able to use and evaluate the general capabilities of the computer as a tool to use in pursuing various discipline- or level-specific educational tasks;

C3.2 be able to use and evaluate alternative hardware/software systems designed to function as tutors and/or teacher aids;

> C3.3 be familiar with alternative hardware/software systems designed to perform school administration.
>
> These competencies should be transmitted within the preparation programs of the teachers, varying in detail with the teacher's intended teaching level and subject. . . .

Competencies such as those developed by ACM, indicate an expectation of a broader capability becoming essential for teachers. In addition, computer-extended classroom activities will necessitate a shift in teacher orientation: teachers will increasingly be required to act as managers of instruction rather than as traditional providers of information. Further, introducing computer-assisted instruction in the classroom offers a powerful new opportunity for individualizing instruction. Such instruction, however, carries with it a new responsibility for the teacher to track progress individually for each pupil. The teacher becomes another "resource for learning," as well as the manager of the learning process.

Training Models

One model for training educators is provided by the National Science Foundation, which has sponsored development of a *Seminar for Educational Decision-Makers*. The seminar is being presented by the Minnesota Educational Computing Consortium in six locations during February and March. The objectives for this "packaged" seminar are:

- To provide basic information for practical and potential applications of microcomputers in elementary and secondary schools
- To present new and recent developments in microcomputer technology
- To discuss future implications for educational institutions, professionals, service agencies, and publishers.

Topics to be covered in this seminar include:

- Microcomputing—What is It?
- Instructional Computing and Microcomputers
- Introduction to Programming
- A Comparison of Several Micros
- Selecting, Purchasing and Managing Micros in Schools
- Developing CAI Lessons
- Administrative Uses of Micros
- Obtaining Software

With funding from the National Institute for Education, Northwest Regional Educational Laboratory (NWREL) has been involved for several years in developing materials for teacher and administrator training, beginning with the REACT series published by Tecnica Education Corporation. Another publication of NWREL has seen a great deal of use for computer literacy courses for students and teachers. Titled *Introduction to Data Processing*, it is published by Fearon Pittman. More recently, NWREL, has released two books through TimeShare Corporation, a Houghton-Mifflin subsidiary. The first, intended for training of teachers, is titled *Computer Applications in Instruction: A Teacher's Guide to Selection and Use*. The book serves as a practical text for preservice or inservice courses. A second textbook, *The Computer in Educational Decision-Making*, was developed for school administrators as a guide to the use of operations research and computer programs in management and decision making.

CONCLUSIONS

Computer-assisted instruction deserves to have a place among the resources and media available to teachers. For some students, CAI will provide new motivation and allow them to progress very rapidly. For others, interaction with a computer may *not* be an appropriate way to learn. The new potentials in instruction created by CAI are increasing the scope of skills and shifting the instructional focus required by teachers; teacher training in instructional computing becomes a central task to be addressed locally and nationally. Models, materials and computer-experienced teachers are all currently available to serve as basic resources to be drawn upon for formal and informal educational computing training and support. In addition, the considerable need for schools to get access to effective instructional software underscores the necessity for local and national efforts such as the NIE-funded MicroSIFT clearinghouse at NWREL, aimed at evaluating and cataloging existing software for easy access and widely-disseminating exemplary instructional software.

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Professional Development and Educational Technology: The WAMI Program

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The states of Washington, Alaska, Montana and Idaho, or the WAMI states, represent 22 percent of the land mass in the United States and contain approximately 6 million people. Two-thirds of the physicians and other health professionals in this region live in three areas including the Puget Sound region of Washington, the Anchorage area of Alaska and the Treasure Valley of Idaho. The remaining one-third practice in the towns and rural communities of a region stretching across five time zones.

The University of Washington in Seattle has the only medical school in this region. Because much of the land is mountainous and inaccessible, the population is sparse and widely separated. In the past fifteen years, a number of health problems confronted the region. Included among these are the large number of candidates who wish admission to medical school, the lack of primary care physicians, the geographical maldistribution of the physicians, the disproportionate distribution of health care resources, especially those of a tertiary care variety and the limited funds available for capital construction.

THE WAMI PROGRAM

The WAMI Program has two phases, each designed to achieve different objectives. In the first or *university phase*, four universities that do not have medical schools provide the first year of the medical school curriculum to medical students. This has allowed expansion of the entering class from 102 to 175, with 10, 20 and 20 first-year positions being reserved for Alaska, Montana and Idaho, respectively. In the

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1978–79 academic year, 73 of the 175 students received their first year of training at Washington State University, the University of Alaska, Montana State University and the Universty of Idaho.

Courses for the university phase are planned conjointly by faculty from the five universities so that a "single, regionwide course" is taught at five locations by a "region wide" faculty. Medical faculty from Seattle travel to the universities to cover those portions of the courses where more than local faculty resources are needed. To monitor the academic quality of the program and to determine whether students are learning in the required way, a continuous and extensive evaluation program is conducted.

At the end of the first year all students go to the University of Washington campus in Seattle for the second year of the curriculum and for the initial clerkships in the third year of the undergraduate medical education process.

Students then have the opportunity of participating in the second or *community phase* of the WAMI Program. In this phase, students spend six weeks in community clinical units (CCU's) working with private physicians in rural communities in the four states. Housestaff officers in residency programs are also assigned to the CCU's for two to six months. These experiences in family medicine, internal medicine, pediatrics, psychiatry, and obstetrics and gynecology are designed to provide a participant with an understanding of how the community is structured and functions, what roles a physician must play in such a community, and what skills and knowledge are required to deliver high-quality health services in such a community. It was hoped that with such exposure, larger number of physicians would be attracted to careers in primary care in under-served areas.

At least once every six weeks medical faculty from the medical school in Seattle visit each unit. During these visits faculty members review the progress of the students and residents, act as consultants to the practicing physicians and provide formal continuing medical education to all health professionals in the area. In this way the educational and patient-care resources that exist in Seattle are made available to the faculty and patients of the community clinical units as well as to other health professionals who practice in the area.

Communication Challenge: Satellites

The single greatest challenge in establishing and maintaining the WAMI Program has been the maintenance of adequate communication between the components of the Program. This is necessitated by the need to share faculty and educational facilities, the need to monitor the quality of the educational experience and evaluate student performances, the need for a cohesive administration to address the many problems which emerge from the cooperative effort and finally, the need to communicate with various decision makers in different units of state government in order to obtain the financial support required by the Program. Each of these challenges involves the transfer of information between people who are separated by distances as great as 3,000 miles.

In order to meet this challenge the WAMI Program conducted a series of experiments involving the use of highly advanced communication satellites. Both the ATS-6 satellite and the CTS satellites used in these experiments have had the technical capability of simultaneously transmitting two-way color television images and voice (full duplex audio video).

Among the experiments conducted were those concerned with the admission process, minority recruitment, faculty sharing; where faculty at the University of Washington presented courses or course segments designed to enrich the curriculum at a WAMI university, consultation process; where the clinical expertise of the school of medicine was brought to bear on specific clinical problems in the region, and independent learning; where the satellite was used to determine to what extent travel could be replaced by this communication modality in the continuing medical education process. In all, nearly 350 broadcasts were presented over a 5-year period. It was concluded that satellite communication has significant applications for health education and health care in the future.

Program Outcomes

The WAMI Program was established to accomplish five goals:

1. Increase the number of students admitted to medical school from the states of Washington, Alaska, Montana and Idaho.

Outcome: Since the inception of the Program there has been an 81 percent increase in the number of students admitted to the University of Washington School of Medicine. This increase has been achieved without a change in the quality of the performance of students involved in the program.

2. Increase the number of students being trained for careers in primary care, including family medicine and primary care internal medicine and pediatrics.

Outcome: Since the inception of the Program, there has been a 100 percent increase in the number of students choosing to enter primary care training programs and who ultimately plan to practice primary care. Included among these are students in the disciplines of family practice, internal medicine and pediatrics.

3. Place physicians in areas of need.

Outcome: As may be seen in the accompanying table, the trainees of the WAMI Program appear to choose to practice in areas of need in larger proportions than do those from the control group. While this is preliminary data, it is strongly suggestive of an educational impact on practice location.

TABLE 1. Location of Practices

Population of	*Non-WAMI*		*WAMI*	
Town/City	*Number*	*Percentage*	*Number*	*Percentage*
100,000+	138	50	27	33.7
10,000–100,000	74	26.8	21	26.3
1,000–10,000	38	13.8	28	35
Other	26	9.4	4	5
TOTALS	276	100	80	100

4. Bring the resources of the Medical Center in Seattle to the communities throughout the four states that have need of them.

Outcome: This goal has been achieved through faculty visits to the WAMI Program sites, through the establishment of a region-wide telephone consultation program called MEDCON and through the use of communication satellites.

5. Accomplish the programmatic goals without new capital construction.

Outcome: No new buildings have been constructed in order to accomplish the goals of the WAMI Program. Existing facilities with minor modifications have been adequate to meet the Program's needs.

Professional Development

The challenges related to professional development in the WAMI Program really centered about two major foci. Included among these are the accreditation of the Program by the Liaison Committee on Medical Education and the challenge of obtaining funding for this undertaking from the participating states.

With regard to accreditation, an extensive program aimed at faculty development had to be undertaken. The goal of this effort was to develop a single, region-wide faculty presenting a single, undergraduate medical education curriculum versus five to 22 faculties presenting five to 22 different curricula at five to 22 different sites. The program to meet this goal was aimed at three different groups as follows:

University of Washington School of Medicine Faculty.

In this case, the challenge was to get the faculty to accept decentralized medical education. This was accomplished by having the faculty members at the University of Washington School of Medicine (UWSM) participate in the planning of the Program through a WAMI Advisory Committee. Once the Program was initiated, faculty members of the UWSM chaired region-wide faculty committees in the various disciplines which were responsible for the various courses taught. As chairmen of these committees, they planned and directed curricular retreats, made site visits to the individual sites, taught in the programs at each of the individual locations and participated in satellite broadcasts from the University of Washington School of Medicine to the participating university. In short, they were involved in all phases of the program from planning, to implementation, to evaluation. They were also responsible for seeing that "a single course" was taught throughout the region.

Faculties at Universities Without Medical Schools.

In this case, the challenge was to convince the universities and their faculties that they could present medical education and that it would not drain fiscal resources away from the remaining programs of the universities. In part, this goal was met by recruiting faculty members with experience in medical education and placing them in these universities. Approximately 50 percent of the faculty who ultimately taught in the Program had to be recruited in this fashion. Secondly, the faculty members from the cooperating universities were involved in retreats related to curricular planning, improvement of teaching skills and the development of evaluation techniques. Faculty members from participating universities also made visits to the University of Washington School of Medicine where they became familiar with faculty members located at that institution, the activities of those faculty members and the overall educational environment at "home base." Finally, joint research projects between faculties in different universities were encouraged and have, in fact, developed to a limited extent.

Community Physicians

In the case of community physicians, the goal of the program was to convince the community physicians that they should participate in this Program and that they could present high quality education experiences for medical students and residents. In order to achieve this, an extensive recruiting effort was made to find practicing physicians who had wanted to be involved and who had taught while they were in residency training. Since many of the physicians who were recruited had graduated from the University of Washington School of Medicine, this did not prove to be a difficult challenge. In addition, departments held retreats for faculty members from "home base" at the School of Medicine and from the communities involved. In these retreats, the entire educational program was reviewed and common goals and objectives, formats and evaluation techniques were developed. Seminars and workshops designed to improve teaching, define goals and objectives, and improve the evaluation of clinical performances, were also presented. These, together with mini-sabbaticals on the part of the practicing physicians to the UWSM did a great deal to improve the teaching skills and knowledge of the practicing physicians as well as to allow them to gain an appreciation of the educational process at "home base" and where they fit in. Finally, visits by faculty from "home base" to community sites did a great deal toward cementing relationships with the community physicians and coalescing a region-wide faculty.

The second aspect of accreditation relates to the quality of the educational experience. In order to evaluate and answer questions of this nature, 34 traditional measures of academic achievement were utilized. Some of these measures were internal and others were of an external measure. Included among these were common examination in every course regardless of where it was given, a comprehensive examination at the end of year one, the requirement that all students pass Parts I and II of the National Board of Medical Examiners, evaluating the performance of students in courses taken together during the second year of the curriculum, and a 25-year longitudinal study of the fate of the graduates. Applying these measures to 1500 students over a period of eight years has led to the conclusion that there is no difference in learning outcomes between those students who participate in the WAMI Program and those who do not.

The second major challenge in professional development related to funding. In this case, the challenge was to convince four state university systems of higher education, four governors, four legislatures, four finance committees and four state medical societies that they should join forces in developing a region-wide medical education program. The end point of this challenge was to meet the goal of obtaining funding from each of the states for the program and have this funding cross state boundaries. In order to achieve this goal, it was necessary to convince the various groups and individuals that the WAMI Program represented a better investment than building their own school, that the costs of the Program were reasonable, that some of the monies appropriated would be spent in their own state, that the quality of the educational experience was not an issue, and that a Program of this nature was required to provide access for "their sons and daughters" and at the same time help meet the health care needs of their state.

To achieve this, a variety of methods were used. Included among these were personal visits on the part of faculty and administrators of the Program to the various groups including Regents of the university systems, the university presidents, governors, legislatures, and state medical societies. In reciprocal fashion various members of these groups were invited to visit the School of Medicine in Seattle to gain greater appreciation for the magnitude of the resource that existed in Seattle. Secondly, presentations of a formal nature were made at hearings before legislative bodies, at service clubs throughout the region, and at meetings of various societies.

Thirdly, a region-wide publication which was distributed to all members of these various groups was developed. This publication, which was called the *WAMI News*, was designed to keep the reader abreast of developments in the Program.

Fourthly, a legislative conference was held each year at the University of Washington School of Medicine to which limited number of legislators from each state were invited. The purpose was to review the progress of the program to date, to acquaint the visitors with the resources at the University of Washington School of Medicine and to answer any questions they might have about the legislative appropriation request for the next session.

Fifthly, a major effort was made to develop articles in the news media involving both television and printed newspapers. It was felt that policy makers were influenced to a large extent by what they read in their local news media and as a consequence articles relating to the students who were admitted to the programs, the honors which they received, developments in the program, etc., were transmitted to the news media for their use. Finally, a lengthy cost study of the WAMI Program was made by an external consulting agency. This cost study was designed to determine what the cost of the program would be for each of the participating states. It served as the basis of negotiation for the appropriation request and turned out to be a very significant element in the development of this program.

SUMMARY

The ultimate test of a program of the nature of the WAMI Program relates to funding, accreditation, and the attitudes of faculty and students who participate in it. Since the WAMI Program is fully funded by the participating states, since it has received full accreditation for seven years and since 90 to 95 percent of the participants of the program are favorably disposed toward the program and in fact are choosing to practice in areas of need in the WAMI states, it is concluded that the WAMI Program represents one solution to a professional development challenge by the use of educational technology.

ACKNOWLEDGMENT

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The "School Without Schools": What It Really Taught Us

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Perhaps the most dramatic, and certainly, the most publicized use of educational technology in recent years was Columbus, Ohio's "School without Schools" project. Nationwide attention was focused on Columbus in February, 1977, when natural gas shortages closed down most of that city's schools for a month. Facing enormous obstacles, the then superintendent of schools, John Ellis, opted for an unorthodox solution: continuing schooling without the schools via technology.

The core of the "School without Schools" plan was an intensive schedule of radio and television lessons presented over both the local public and commercial stations. Other components included a special section in the daily newspaper devoted to the project, extensive field trips, access for high school students to local colleges and universities, formal class meetings once a week in the few school buildings remaining open, and as much on-going teacher-student contact as possible between those meetings.

The project might well have gone the route of any number of other educational innovations: As the initial burst of publicity fades, so does any potential for a lasting impact on the educational process. In the case of Columbus, the "School without Schools" was an ad hoc response to an emergency. The project could be sustained once the crisis has passed.

Nevertheless, what happened that winter in Columbus continues to be of interest. The "School without Schools" has become the symbol of a growing phenomenon. To illustrate this point, let me cite two very diverse examples:

> When record snow storms closed Kentucky's public schools for two weeks in the winter of 1978, Kentucky Educational Television (KET) and Louisville's WKPC-TV, Ch. 15, took up the slack.
>
> KET's "Snow School" supplemented that network's regular instructional programming with 60-second breaks which included program activity tips, exercise suggestions, and announcements of free learning packets upon request.
>
> Louisville's WKPC-TV responded by suspending the regular broadcast schedule and substituting six hours of live instructional

programming daily. While "PS 15" was aimed at students K-12, when the station discovered that entire families were tuning in, the content was quickly broadened to include such topics as cooking and consumer awareness. Later, when phone calls revealed that many families were experiencing "cabin fever", special segments were added on human relations using professionals from the community.

An important consequence of the planning for "PS 15" was the development of a thirty-day plan for Jefferson County for emergency instructional programming.

In the aftermath of California's Proposition 13 "taxquake", television has provided a number of instructional services that otherwise would have been eliminated because of budget cuts. When summer school was cancelled throughout the State in 1978, five of California's twelve public television stations responded with special instructional programming. KCLS-TV, Ch. 58 in Los Angeles, provides a particularly impressive example. With only three days lead-time and a budget of $70,000, the station put together 120 hours of programming for seniors needing supplemental instruction to graduate. Seniors were able to take the two courses—English and U.S. Government—for credit, and then take the final exam in one of four locations.

During the school year as well, television has provided programming in areas where public school budgets had been sharply cut; among them, music and arts programs, career education, and affective education.

Beyond the immediate impact the "School without Schools" had as a national model for education in emergencies, the project ultimately has even larger implications. It provided a dramatic demonstration, in full public view, of a technology-based educational system. And, as such, it offers an important source of study for the field.

Evaluation of the "School without Schools"

The National Science Foundation awarded funds to Western Michigan University to assess the impact of the "School without Schools" locally and to determine its future exportability. The findings contain a strong message for the field.

The research focused specifically on the use of television—to the unfortunate exclusion of radio—and used data from the Nielson and Arbitron surveys, as well as information from interviews with teachers, administrators, parents and students.

In general, the researchers found that the mediated instruction was *not* as instructionally effective as either the formal class meetings once a week or the marked increase in homework assignments during the school closings. The data from the Nielson and Arbitron surveys indicated that not all students were watching television when they could have. Moreover, when given an attractive alternative to educational programming (e.g., "Happy Days"), a number of students selected the alternative.

It would be easy to attribute the shortcomings of the mediated instruction to the hurriedness of its preparation. The short leadtime was certainly not very conducive to a systematic, quality-controlled production process. Nevertheless, the research indicates that the most significant reason why the mediated instruction was not as effective was that the student participation was voluntary rather than mandatory. In fact, the only solid requirement for students was that they attend formal class meetings once a week.

The fact that the classroom instruction was mandatory, while the mediated instruction was not, was hardly coincidence. It was a concession to the local teachers' union which felt that teachers should not be held accountable for student performance during the closings, or for more than the one class meeting per week—even though teachers were responsible for the development of the mediated instruction.

Certainly, in anything other than an emergency, it would have been extremely difficult, if not impossible, to sell the idea of the "School without Schools." The local chapter of the Ohio Education Association had to be reassured that the use of technology would not undermine their position. The union contract was renegotiated to allow a virtual suspension of normal hours and working conditions, in exchange for a guarantee of no lay-offs during the closings. The school board, often split between its liberal and conservative factions, had to be persuaded to offer its unanimous support. In addition, the state legislature had to be persuaded to suspend the usual 182-day school requirement on which state aid and accreditation are based.

The findings of the Western Michigan study underscore a familiar theme: the necessity of sensitivity to the many institutional issues involved in utilizing educational technology. As Robert Heinich pointed out in a commissioned paper for the U.S. Office of Education, "Technologically-based instruction poses a threat to the (power) base of our present system and the more comprehensive the technology, the greater the threat."[1]

Given the nature of the threat that the "School without Schools" presented, it is hardly surprising that neither the National Education Association nor the American Federation of Teachers came out with any public statement on the "School without Schools" at the time, despite the fact that it was widely reported in the mass media. They could hardly be expected to endorse a solution that might seem to bypass the supremacy of the classroom teacher in instruction.

Nor is it surprising that less than a year later, when the schools in Columbus, as well as elsewhere in Ohio, faced closings because of levy failure no suggestion was made to repeat the "School without Schools". In the original situation, the teachers' union was willing to agree because they were guaranteed no lay-offs. In the subsequent situation, they would not support anything appearing to be a cost-effective alternative to traditional instruction, at a time when there was no money for teachers' salaries.

Implications for the Energy Crisis

In the face of considerable institutional resistance to educational technology, it is especially important to explore the rationale that current events and issues may provide for its use. The energy crunch, for example, may ultimately provide a persuasive rationale for the use of educational technology.

The city of Columbus was certainly not alone in the problems it faced during the winter of '77. Severe fuel shortages and spiraling fuel costs forced many communities across the country to close down their schools. The American Association of School Administrators estimated that at least 40 million pupil days were lost that year as a result of the energy crunch alone. A total of more than 22,000 in 13 states were affected.

Based on the success of the "School without Schools", the suggestion has been made that during periods of high fuel consumption, communities might well consider closing their schools and relying on public broadcasting to provide instruction.

Public broadcasting stations are far more likely than commercial stations to play a long-term role in this area. Commercial stations are inhibited by the potential loss of advertising revenues. (WBNS, the NBC affiliate in Columbus, estimated that it lost about $100,000 in potential revenues during the period of the "School without Schools".) While public stations are not without their own share of financial problems, they are not constrained in the same way. Furthermore, it is the specific mission of public stations to serve their communities' educational, cultural, and public service needs.

To date, at least one study has been conducted which looks at the comparative energy costs for operating public broadcasting stations versus the energy costs for operating all the school districts in their coverage areas.[2]

Specifically, the study looked at Scranton, Pennsylvania, a mediumsized urban area in a state that has been particularly hard hit by energy shortages in the past.

Scranton boasts two large public broadcasting stations: WVIA-TV and WVIA-FM. Within the coverage areas of these two stations are 14 school districts, representing a total of 240,000 public school students.

According to the study, the energy bill in December, 1976, for both WVIA-TV and WVIA-FM totalled approximately $7,800. This reflected the electricity and oil costs for two buildings, the transmitter, and ten relay stations.

In contrast, the energy bill for the 14 school districts for the same period was approximately $600,000. This included the coal, oil, natural gas, electricity, and steam heating costs for operating the 195 buildings in the 14 districts.

The study noted that the total for the school districts was low for an average winter month due to time off for Christmas vacation. Moreover, the study only looked at the costs for plant operation. The energy costs for school transportation programs would have raised the final total substantially.

The contrast between these two figures is dramatic. The energy costs for operating the public broadcasting stations were less than 2% of the total energy costs for the schools.

Based on research such as this, a community might well decide to extend the traditional Christmas school closings through the entire month of January. Classes would resume in the New Year, however—only via radio and television.

The findings of a study funded by the Colorado Department of Education in 1974 seem to support this conclusion. The Colorado study estimated that by shutting down and draining the heating system during December and January, a school enrolling 500 students could save almost 25% on heating fuel annually.

Obviously, with the energy picture changing as rapidly as it has in recent years, more current research is needed. The sort of cost comparison discussed here represents a first step. The next step, and an infinitely more complex task, is to determine the overall energy costs to society. For example, what is the impact—in energy terms—of having students at home who would normally be at school?

Related to this discussion, the U.S. Department of Commerce funded research several years ago on the energy trade-offs between telecommunications and transportation. This research explored the energy savings in business situations where telecommunications systems were used to move information to people, rather than transportation systems to move people to information. Looking at education in these terms, the suggestion was made that it would be interesting to speculate on how the concept of school consolidation would have evolved, if we had relied on telecommunications technologies rather than on the outmoded technology of school busing.

Implications for Educational Reform

Certainly, the "School without Schools" provides an important model for educating under crisis conditions. Yet, the "crisis conditions" are generally conceived of as situations external to education: Weather emergencies, fuel shortages, natural disasters, health hazards, and such. What relevance does the "School without Schools" have for the internal crises facing American education? The brief discussion that follows attempts to explore some possible implications.

A major concern these days involves the growing financial pressure on educational institutions to become more cost-effective. While the Columbus project was not specifically intended to do so, it nevertheless demonstrated the feasibility of a technology-based system. One question that the success of the project raises is how we might attain more cost-effective configurations by replacing certain components of the present system with technologically-oriented ones.

Along this line, it will be interesting to observe what impact the tax reform movement ultimately has on the use of technology in education. Small scale technologies—traditional AV aids—are apt to be prime targets for budget cuts. (Unfortunately, anything viewed as an aid to instruction is more likely to be categorized as "frill".) Large scale technologies, however, offer an alternative for the delivery of instruction, not just an aid. In tight-budget times, the potential cost-effectiveness of such alternatives cannot be easily overlooked.

Another frequent area of concern involves school/community relations. While the "School without Schools" was officially a program of the Columbus Public Schools, it was, in fact, a total community effort. Television and radio made a major contribution in breaking down the barriers that tend to exist between schooling and the rest of society. Many segments of the community, not usually involved in the educational process, were used as resources in the development of programming. Moreover, the programming had an impact far beyond its intended audience. The Western Michigan study indicated that other age groups also tuned in, and more importantly, stayed tuned. As John Ellis observed, "Schools tend to be isolated from the community, but this project has gotten to everyone."

The last, and potentially, the most explosive, of the issues discussed here is that of teacher militancy. The "School without Schools" provided proof that technology could take over during emergency school closings. What, then, if the emergency in question were a teachers' strike? The scenario suggested here—television crossing the picket lines—may seem improbable at present, but it is by no means implausible. Local school boards, after all, constitute a sizable percentage of the licensees for public television stations. The possibility of electronic strikebreaking is certainly not one that educational technologists would welcome, but at the same time, it is not one that they can ignore.

The real significance of the Columbus project may have been summarized best by Fred Hechinger in a feature article for *Saturday Review*: "If (the "School without Schools") does not point to . . . utopian solutions, it should not at the same time be written off as a fluke. On the contrary, much of what happened briefly in Columbus places in full public view some highly persuasive lessons for long-term school reform."[3]

RECOMMENDATIONS

The experiences of the school "School without Schools" taught us a number of important lessons. It is obvious that schools will continue to close for any number of reasons. Every school district needs to have a crisis plan on the shelf ready for implementation. Since most districts cannot afford to direct scarce resources to contingency planning and development, the onus for action is on state and federal agencies supporting education.

The events in Columbus suggest the need for further research. Certainly, an important dimension of crisis planning involves research on viable alternatives to classroom instruction during emergencies, on the sorts of organizational behaviors that are required, and on the nature and effects of different crises on schools and schooling. As discussed earlier, research is also needed on the energy trade-offs between technology-based instruction and traditional school-based instruction.

The Columbus project further underscores the need for teacher training in the use of educational technology. Above and beyond that, it also emphasizes the need for greater sensitivity to the various barriers to the utilization, and ultimately, the institutionalization of technology.

Finally, there needs to be a mechanism for disseminating information about outstanding projects. While the "School without Schools" achieved national visibility through the extensive media coverage at the time, there has been no place that school administrators could go for "nuts and bolts" information. This end might best be served by a catalogue of educational technology projects distributed to school districts and institutions of higher education. This last recommendation has been made before. Its repetition here only underscores its urgency.

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Training and Development In The 1980's — In Perspective

Kevin O'Sullivan, Executive Director, American Society for Training and Development, Madison, Wisconsin

> "My interest is in the future, because I am going to spend the rest of my life there."
>
> — Charles F. Kettering

THE U. S. ECONOMY IN THE 1980's

- Slow rate of growth
- Inflation
- Widening gap between rich and poor real income
- International monetary crises
- World market competition
- Union pressures (over 50% of payroll in benefits)
- Energy constraints

THE U. S. WORKER IN THE 1980's

Older

(Average 28 in '75; 37.4 in '80; 40 in '90)

Characterization of Decades "Core Market Focus"

1950–1960	Babies and young children
1960–1970	Teen-agers and young adults
1970–1980	Young marrieds
1980–1990	Early middle agers
1990–2000	Middle agers

Mobile

—20% of all American families move every year; 13 times in a lifetime; average every 5 years

—Later marriage, fewer children, divorce ratio: 1 in 3

—Frequent job/occupation change (12% of the workforce changes jobs annually)

—"Retirement is becoming flexible. A very large proportion of people who take early retirement will only take it to go to work elsewhere. People will have far more control over their careers than they have ever had before. . . . It is not at all impossible within another 10 years, that part-time people who work permanently part-time will comprise 1/3 to 1/2 of the labor force. The very great changes in our labor force are very largely training opportunities."

Peter Drucker

Better educated

—70% will have H.S. diploma by 1980

—College degree cost inflation:

	1978	*1990*
Private	$24,000	$82,000
Public	14,000	47,000

—*The Futurist*, December 1977

—Over 150,000 underemployed PhD's by 1990

—*MSU Topics*, Summer 1977

Changing values

"New employee values are emerging as evidenced by every employee attitude study over the last 5–7 years. These people are not satisfied with symbols of conventional success. They want something more. In the new value system there is only one success, and that is to spend life in your own way. In the old success philosophy, what counted was symbolized by acquisitions *outside the self*—such as a new car, a nice home, a job promotion; in the new philosophy, what counts is *inside the self*. As a result, we have seen a steady decrease in job satisfaction; a general decline in the value of work and an increase in the value of leisure as sources of meaning in life; an increased desire to work in environments that enhance one's sense of self-esteem at the same time workers' perception of being treated fairly by the company continues to decline.

"Consequently, if management's response to our productivity slump is to speed up production through increased control, stricter work rules, closer supervision; and to further fragmentize the work process; it is quite possible that workers' growing discontent will seed into a generalized antagonism that will only cause a further decline in productivity growth through absenteeism, production slowdowns, poor quality work, or in the extreme, strikes and sabotage."

—*Jan Margolis, (Training and Development Journal*, October 1979)

"Jobs are becoming increasingly routine, requiring less and less worker discretion. While this has been assumed on the assembly line, it is increasingly the case with the workers in both the public and private sectors with the proliferation of rules and procedures, forms, and reports. While they may be intended to assure fair, efficient, and equitable handling, they can also have unintended effects such as worker boredom. One estimate is that three-quarters of today's jobs can be learned in less than three weeks.

"Recent data indicate that people are spending significantly less time per week in paid work and family care responsibilities, and more on leisure. This pattern holds constant for both men and women, single and married. But, it is most striking with respect to single men. In 1965 this group spent 51.5 hours per week in paid work, and 36 hours in leisure. However, 10 years later, by 1975, paid work consumed only 40 hours per week, while leisure had risen to almost 45 hours per week (44.9)."

—*American Association for Higher Education* ("Performance and Liberal Education" white paper, 1979)

Changing perceptual styles

—Over-entertained
—Over-stimulated
—Eyeball-quick
—Visually-oriented
—Time conscious
—Restless
—Critical

TARGET OF THE '80's: INCREASED PRODUCTIVITY

"What is productivity, and what are the factors that have contributed to its decline? There are two broad ways of defining it: one from the perspective of the economist; the other from the perspective of management.

"When we read about productivity growth problems in the newspapers, the discussion is generally related to the economy as a whole, and occasionally, to an industry as a whole, such as the consumer products industry, or the retail trades. When we look at productivity from that viewpoint of the economy or a total industry, the *simplest definition is an economic one — output over input*. It is a quantitative definition. Output is what you produce (car, hair dryer, or service).

Input is what it takes to produce output. It may include physical labor, mental labor, capital investment, machines and tools, education, training. The goal is to MAXIMIZE output in relation to input.

"The second way of *viewing productivity is from the perspective of management*. Managers naturally tend to view productivity from the perspective of their own organization. And they take a more qualitative view than do the economists. In a study of the assumptions about productivity held by managers, Yankelovich found that while 90% of those surveyed agreed with the economists' output over input equation, 88% also felt productivity could be measured by the overall efficiency and effectiveness of their operation; 70% felt productivity includes such factors as rate of absenteeism and turnover; 73% felt it includes such intangibles as disruptions, "shrinkage," sabotage; 55% felt it included intangibles such as employee loyalty, morale and job satisfaction; 64% felt it includes measures of customer or client satisfaction.

"While we still have the highest productivity *level* of any nation in the world (including Japan and Germany, our closest competitors), our *growth rate* of productivity has slowed. *The official forecast of the President's Council of Economic Advisers projects a productivity growth rate of only 1.5% per year over the next 5 years, compared to 3.2% before 1967.*"

—*Jan Margolis (Training and Development Journal*, October 1979)

Many factors contribute to productivity decline, including world economics (devaluation of the dollar since leaving the gold standard in 1971); inflation; reduced capital investment; decreased levels of R&D; government interference; etc.

But worker competence and fulfillment in the workplace also have major influence on our productivity profile — and it is in this arena that training and development specialists can and do make a substantial contribution.

It is essential to remember, however, that rifle-shot training strategies are far less effective than a comprehensive effort which takes into account the dynamic interdependence of the multiple elements which comprise every organization:

How successful we are in impacting on the total organizational mix will in large part determine how effective our interventions and contributions will be. . . .

TRENDS FOR THE '80's

- Management's growing support for T&D/HRD=ROI (The "APC" formula: Accountability/Productivity/Cost-Effectiveness)

- Increased synergy of researchers/technologists/practitioners
- Evolution of HRD as a craft and science—and lifelong career
- Education's growing involvement in lifelong learning
- Government's growing involvement in lifelong learning
- Technological advances [computers, microcircuitry, miniature television systems with flat screens, improved software, job aids (algorithms, models, simulation, games, etc)].
- Holistic mind/body research and application (biofeedback, autogenics, suggestology, creative problem-solving, learning enhancement through chemical science, left/right brain phenomena, neurolinguistic programming, understanding of life and career "passages").

QUOTES TO PONDER

"Perhaps there is no such thing as a "new idea" . . . just wisdom rediscovered — and synthesized in a new way."

Kevin O'Sullivan

"We are made wise not by the recollections of our past, but by the responsibility we take for our future."

George Bernard Shaw

"Sometimes I wonder if you know how to get the most out of your knowledge, your dedication, and your hard work — whether you really know how to make yourselves fully effective. I'm going to shock you and say that most of you, whom I've seen, don't — for the simple reason that you do not see yourself as a member of the management team . . . you see yourself as a training professional, and that you are; but it isn't enough. And you teach other poeple, very successfully, to go beyond the professional definition of their work — and you are very good at it. But you don't really project that same kind of knowledge on yourself. Because if you did, you'd realize that so much of your training and your development is not really becoming effective because your organization does not really help to make it effective."

Peter Drucker

"We must demonstrate to management not how humanistic we are . . . but how relevant we are."

Dugan Laird

"What does your daddy do for a living?"
"My daddy develops human race horses."

(child's name withheld at parental request)

"You face as challenging and interesting and exciting a time in your work as any we have had . . . a great and challenging period in which a lot of new important and difficult things are going to come your way . . . partly because of the long and dangerous decline in productivity in all developed countries. While training

> is only one of the answers, it is by far the key answer.
>
> "You are going to keep on complaining that top management doesn't pay you enough attention. Keep on complaining. If you ever stopped complaining, I'd become very nervous. But there's no danger of that, fortunately. You keep on.
>
> "You will, I think quite rightly, keep on complaining not only that we don't pay enough attention to you, but that we don't know how to make the best use of you. There I'm much less sympathetic. That's largely your fault. You haven't really told us. And you will keep on complaining that the job is so much bigger than the forces you're allowed to have, the time you're allowed to have, the money. And you are right. But that's largely because the job keeps on growing. Because what is growing is the demand and not the supply. One has to increase the yield.
>
> "You represent a tremendous resource, and one we have built up only in the last 20-25 years, really. Believe me, the years ahead are the years in which we really need the yield from this resource. In which we really need you to become fully effective, fully productive — as professionals, as consciences, and as leaders of the management team."
>
> *Peter Drucker*

> "Our society is showing signs of 'going down the tubes.' Productivity, creativity, education, job satisfaction, and health care all show declines or serious problems. Our nation faces critical issues in human factors. A major share of the responsibility for solving these problems is in the hands of HRD practitioners — even though many in our field don't realize it. It's going to take great discipline to cope with these challenges, and we must concentrate on the theoretical basis of our work to better understand what we do."
>
> *Bob Blake and Jane Mouton*

And, in gaining that understanding, we will also be facing the increasing pressure accompanying the intrinsic responsibility which will be ours as a legacy of our evolving influence.

We have resources to draw upon . . . mentors available and willing to help us grow . . . and the community of ASTD as a forum for keeping perspective and finding new energy and joy in the work we do. As Emerson observed, "Nothing great was ever achieved without enthusiasm." And we are blessed in our field with some of the most creative, gifted, and enthusiastic minds in America. And together, in the 1980's, we will be a force to be reckoned with!

As we move into a brand new decade, making *resolutions* is one way to discipline ourselves for new directions and future problem-solving. A philosopher once suggested that "Today's hindsight isn't worth much — unless it is used as foresight for tomorrow."

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Microcomputers Applied to Education

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INTRODUCTION

My comments are partly derived from an NSF document prepared in the Science Education Development and Research Division. Its title is, "Technology in Science Education: The Next Ten Years." First let's consider the way the cost and power of microcomputers will unfold during the coming decade. The hardware of microcomputers will probably develop in the following way during the next few years:

- The cost will probably stay the same. A price of six hundred dollars per microcomputer will not be reduced much.
- However, we will have continually increasing computing power in inexpensive microcomputers of around one thousand dollars. Dr. Licklider of MIT estimates that there will continue to be a doubling of computer power every two years. This means that within ten years the computers you will be working with will be approximately thirty times more powerful than the ones that are around today. This will make a significant difference in the kinds of things that you and your students can do with these devices. This power will place a premium on asking questions such as the following: How do we envision these devices? What kind of languages should we use to program them and interact with them? Are there ways that we need to change our educational system in order to capitalize on the capabilities of the microcomputer?

In arriving at answers to these questions, we should be somewhat cautious. We seem, in the field of educational technology, always to be trapped by our images of the past. As a result the first instructional programs used the computer as an elaborate page turner. To escape this tendency to trivialize a potent new technology, we need to apply imagination, skill and talent to find interesting new uses of this most flexible of technologies.

My experience leads me to conclude that imagination and skill, while necessary, may not be sufficient. In order to realize the potential of the information technologies we need to think about two related factors: 1. social inventions, 2. organizational structure. By social inventions I mean a variety of possible things. Let me try to clarify what I mean by some examples. An example of a social invention is the development of the land grant college. This social invention unlocked tremendous forces of creativity in our country. Another social invention is consumer credit. Still another was the GI Bill. Is there a similar change in how we conduct our educational affairs that could unleash the power of the computer in education?

Organizational Structure

The other area that needs attention is that of organizational structure. It seems reasonable to me that, to be effective, organizational structure (how we make working units for people; how units report to each other; how we allocate resources among units) should reflect the dominant technology that is being used by the organization. I would claim that our schools are a good example. The organizational structure of schools, as reflected by disciplinary departments, teachers in classrooms and the way we allocate resources, helps people to be effective with the technology of the blackboard, the classroom, and text books. And I think the organizational structure of schools does amazingly well in helping teachers to be productive with that technology (classroom, blackboard, textbooks). A characteristic of that traditional technology is that, in contrast to the production of a computer based course, very little front end investment is required before you have something to present to the student. If we are going to use some of the newer technologies, I would argue that we need to rethink the organizational structure of our educational institutions. We will probably have to devise some new organizational arrangements in our schools for people to be effective if the computer is to be the dominant technology.[1]

An opportunity to obtain the resources for the development of educational materials for the new information technologies comes from needs that cannot be met in any other way. This pattern is typical of a new technology, whether it is busses, trucking or aircraft in competition with the railroads or motels in competition with hotels,—and there are many more examples in the history of technology. Typically one does not make progress in the application of a new technology by direct competition with the massive, in-place establishment based upon the existing technology. Rather, what usually happens is that the new technology is applied to some need that is not met by the old technology. This unmet need is the entry point that permits the new technology to gain a foothold and grow. Repeating one of the examples mentioned above, the motel was not developed by the hotel industry; but recently when I looked up 'hotels' in the yellow pages, it said, "See 'motels'!" Examples of unmet needs that may provide the rationale for investment in courseware and instructional software for microcomputers are the following: Instruction for the handicapped that are being taught in regular classes; on-the-job instruction for workers involved with complex and changing conditions such as auto-repair; instruction for isolated people; instruction for members of the armed-forces who must be kept technically and scientifically up-to-date.

Because of the recent history of the cost of technological innovation, people have become skeptical of claims of cost savings. However, increasingly the new information technologies will compete directly with printing on a straight economic basis. When you can put the equivalent of the Encyclopedia Britannica on a digitally encoded video disc, it will offer very serious competition to print. As someone said, the electrons don't get tired, Although we will always want hard copy at times, the business of shipping paper around and putting ink on paper will become an increasingly expensive problem.

Vision

I would now like to introduce the idea that our vision of the world in general and computers in particular affects how we think about the new technologies and how we use them. Joe Novak used an example that exemplifies this. He said, "You don't set out to sail around the world if you think the world is flat." The moral is that the way you think about the world affects how you classify and interpret every event that occurs in your life. It affects your goals even when you are unaware of the influence. Let me come back to this point by a slightly round about route. I would argue that, at present, the computer is not a replacement for human conversation in the process of instruction. However, if we envision the computer as a source of simulations, if we use the computer as a display device that serves as a stimulus for enhanced human discussions (rather than as a replacement for human conversation), I think we may be on to something. But notice how hard it has been to escape the image of the computer terminal as something worked on by a single person interacting only with the computer. I and several other people who have worked in the field of individualized instruction have come to the conclusion that working alone lacks something. There seems to be a benefit in the ritual and dialogue of the classroom, in having students talking to each other. As a result several investigators are now designing computer based education to encourage pairs of students to work on a computer simulation problem. What is reported and what I have observed is that the students engage in a fairly intense conversations, arguing about what to do next, what is the correct way to think about the problem that is before them.

SUMMARY

In conclusion, then, I would propose that to realize the full potential of the computer we will need a richer vision of human development and human learning. I would also propose that we need to more fully grasp the nature and power of the computer as an extension of human intelligence. Only then will we be able to design learning environments that orchestrate the fantastic range of possibilities that the new technologies have opened up for us. We will need imagination and talent as well as a sense of the indispensable role that human interaction should play.

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The Role of Technology in Education

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Educational systems throughout the country are beginning to recognize the educational, economic, political and social significance of new telecommunications technology. Projects on American campuses are proving new telecommunications technologies creatively designed and deployed, can be used to provide a wide variety of new services. Such technologies as computers, telephone, cable television, and communications satellites are helping to improve pupil instruction; increase opportunities for minorities; increase enrollment in off-campus classes; increase community participation in campus events; improve facility utilization; and permit sharing of curriculums between institutions separated by great distance.

With the introduction of communications satellite systems a decade ago, a technological infrastructure was established for electronically delivering educational services on a national scale. Computer based services from health information and electronic correspondence courses, to training for the handicapped are now possible through the interconnection of such technologies and media systems as computers, telephone, broadcast radio and television, cable television, video discs, fibre optic, microwave systems and satellites.

While the technology revolution was predicted for 1984, it is here today. A variety of revolutionary telecommunications systems and services are now in place and being marketed to educational institutions and systems throughout the country. However, the acceptance of many of these systems is minimal, and many are still experimental.

Since 1974 the Booker T. Washington Foundation has been one of the leading minority institutions involved in research demonstrations and developmental projects aimed at testing the application of new technology to educational institutions, particularly black colleges and other minority institutions. The purpose of the BTW programs is to devise an economically viable plan which will mobilize and coordinate telecommunications technology in a manner which will support the long term viability of minority educational institutions. Until recently, minority institutions have not benefited from the new technology, and thus, have been unable to maintain the quality and level of services required to function competitively with the larger, predominantly white institutions. Consequently, minority institutions have continued to lose students to other institutions. Through the activities of BTW, indications are that the telecommunications industry may offer a way out of this dilemma.

For example, one project, conducted two years ago, demonstrated that communications satellites can greatly impact on minority institutions located in rural areas. The project linked a large urban medical college with a black college in Tuskegee, Alabama.

In 1978 the Communications Technology Satellite (CTS) was utilized to link in a two-way communications mode George Washington University Medical School (Washington, D.C.) and Tuskegee Institute (Alabama). The demonstration was sponsored by the Lister Hill National Center for Biomedical Communications of the National Library of Medicine, and provided a month-long series of health seminars for juniors and seniors enrolled in the Division of Allied Health at Tuskegee Institute. The seminars were developed and conducted by health experts from the Washington, D.C. area. Subjects covered included physical therapy, rehabilitation training, occupational therapy, anatomy, gerontology and rural health. Among the participants were faculty members from George Washington University Medical School, Howard University Medical School, National Institute of Health and members of professional health associations.

All of the telecasts originated simultaneously from the television studios at the Veterans Administration Hospital at Tuskegee Institute and the National Library of Medicine in Bethesda, Maryland.

Included in the demonstration were two teleconferences between physicians at the John A. Andrews Hospital (located on the Tuskegee Institute campus) and health professionals from two rural Alabama health clinics with physicians from Howard University Sickle Cell Disease Center, physicians from the Veterans Administration Hospital in Washington, D.C., and administrators from the Public Health Services in Rockville, Maryland.

As a result of the demonstration it was concluded that communications satellites can provide a new and beneficial mechanism for sharing and developing health curriculums between educational institutions vastly different and located at great distances. More specifically, the demonstration proved:

1) Communications satellites can bridge the gap between educational training in rural areas and urban areas;
2) Communications satellites provide opportunities for national experts to provide information to larger numbers of people; and
3) Communications satellites allow institutions to share curriculum resources.

A major focus of the project centered around evaluating the use of satellite technology in curriculum development. Therefore, the Lister Hill National Center contracted the Mitre Corporation to conduct a comprehensive evaluation of the project. The following are some of the findings of the evaluation effort:

1) After the first two seminars the distractions caused by the use of television cameras were eliminated and the satellite did not interfere with learning;
2) The faculty participants said they felt the satellite seminars were as effective as some of the seminars given through the traditional method;
3) All participants felt satellite communications could not replace other forms of teaching, but could enhance instruction. As one participant put it, "Satellites could be the hottest thing since continuing education."
4) Dr. Theodore Childs, Director of the Allied Health Program at Tuskegee Institute and the satellite project manager for the Tuskegee site said, "Through the use of satellites, Tuskegee Institute could become a center for the training of physical therapists in Alabama."
5) Student participants liked the idea of having a variety of instructors who offered different teaching techniques; and
6) Instructors tended to be better prepared for the satellite course than they are normally.

As a result of the project much was learned about the future direction of satellites in education. In particular, the demonstration proved that curriculums could be developed between institutions through the use of communications satellites. Video tapes of each of the seminars were made and can be made available to other institutions seeking to develop a curriculum in Allied Health.

The satellite demonstration illustrated one of the uses of new telecommunications technology. Other demonstrations by the Booker T. Washington Foundation have been as successful. Thus, it can be concluded, creatively applied, satellites, cable television and related telecommunications systems can alleviate and ultimately eliminate developing crises in education today, such as shortage of teachers and instructional supplies, overcrowded classrooms, lack of facilities, and increased enrollment. More importantly, telecommunications technology can create new options for educational institutions, particularly in rural and disadvantaged areas. These options include the use of video and computers to reduce the need for new classrooms; the use of cable television, video discs and satellites to deliver educational services directly to individual homes; use of telephone technology, video discs and cable telephone to provide educational services to the handicapped and others confined to the home; and the use of computers and cable television to increase access to libraries, archives and museums for all classes of users.

Yes, the revolution is already upon us; the wider use of available technology seems certain to affect educational institutions, students and teachers in ways that may be startling. For example, one new technology, fibre optics, is based on the concept of using lights to send signals over cheap and plentiful glass fibers. The economic feasibility of this technology may hasten the wiring of communities and institutions throughout the United States and the world. What the scientists foresee is an interfacing of various technologies in which fibre optics will combine with the technology of the telephone, cable television and satellites to provide various new services and communications systems. The results will be an extraordinary multichannel interactive communications world. The important factor is the ability to have two-way interactive communications. The era in which people hear, but are not heard is quickly passing and major emphasis is being placed on feedback. This factor is significant to the future of education.

In summary, educational technology and educational institutions have a common future. However, what that future will be is unsure. More research and demonstrations are needed to insure that technologies and systems are designed and placed in use that satisfy the needs of educational institutions. For the major concern of technology must be to expand and improve the quality and quantity of services available.

Educational Technology—The Next Decade

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I am very happy to comment at a time when we are at the threshold of a communications revolution—a revolution which I hope will have an impact on the nation's 110,000 schools over the next generation. It may seem self-evident to state that we are at the threshold of a communications revolution. The fact is that wasn't always so obvious. I was at CBS in 1967 when it, in theory, started what is now called the "video revolution." In 1967, CBS invented EVR, Electronic Video Recording, which was the first machine that could play a program back through a television set. I also remember a cover story in Life Magazine in 1971 or 1972 about the "video revolution."

But we all know there never *was* a video revolution in the 70's.

So to say that we *are* on the threshold of a revolution today is really not as self-evident as it may seem. It demonstrates, indeed, that there is nothing more important, or exciting, or compelling, as an idea whose time has come. And despite the fact that many of these new video technologies have been around for 10, 15, and, in some cases, 20 years, at the beginning of the 1980's we begin to see the widespread use of this technology. As the President of Universal Pictures said several weeks ago, "Nothing will ever be the same."

Let me give you some background on the extent to which this revolution is already capturing the consumer market. There are approximately 75 million homes in the United States, and already 6 million of those homes subscribe to some kind of pay television. Six million American families are paying upwards of $9–$10 a month to bring a television service into their homes which complements that which they have been getting free from commercial and public television. There are a million families who already own video cassette recorders, and that figure will increase 50 percent by Christmas of 1980.

The future is even more exciting. By next year at this time, there will probably be two or three major video disc systems on the market; and by the end of 1981 (which will be the first significant year for video disc), there will be upwards of 300,000 players in American homes. New cable systems have up to 80 channel capacity, and there's little doubt that Comsat will be successful in developing and marketing a satellite system that will bring up to 6 channels directly into American homes by the end of this decade.

This technological explosion can have a major impact on our educational system. I hope it does. I hope these technologies bring increased opportunities for educational program development. Because that's the issue: what kinds of programs, what kinds of software are going to be transmitted through these systems, and how are they going to affect our schools. To be sure, the very existence of new means of distribution (and that's all this vanguard technology is, by the way, simply new distribution systems) which are less expensive and, in many ways, *better* than our existing systems, can compel those of us who are developing programs to do them better and more effectively.

So a major issue is whether those of us in both the public and private sectors, who are involved in "mass communications," are going to take proper advantage of the opportunity this technology represents. At present most schools do not consider educational technology all that central to their goals. It is an accessory—often even a frill. Important—but by no means critical. And, as a result, it does not always get the attention it deserves—not in professional development; not in dollars; not in commitment. But, if the new technology is as exciting as it promises to be—and becomes as much a part of the mainstream across America as it promises to—then it can become correspondingly more important in our schools.

Let me give you an analogy. There is currently available to companies like Disney a modest distribution system for providing motion pictures to families to show in their homes: 8mm films. It's a system that's been in place for decades. The fact is, however, as of today there are only 400,000–500,000 American homes with 8mm sound projectors. Why? Because it's not very good technology. It is expensive, requires a darkened room, a separate screen, and a special relationship between the projector and the screen. Expensive, cumbersome, noisy, not very satisfactory at all. So our success in providing Disney movies to families for home viewing has been inhibited by limitations in the technology. There are already over twice as many homes in America that own a video cassette play back unit, as own an 8mm sound projectors. Why? Because the technology is more exciting, because the technology is simple and convenient. So what's going to happen is that, while the software, in this case, may not change much, more people will be interested in it because the means of using it is better.

I'm hopeful this will happen in the nation's educational institutions, as well. I'm hopeful that better technology, given even the *same* software, will bring audio-visual *more* into the mainstream . . . so *more* educators get involved with it, so that other *kinds* of educators think it is important. And so that, in the final analysis, the very existence of this new technology will encourage us to do better and more exciting programs.

Consider music. The music being promulgated today—some of the extraordinary recordings being made—are a function of technology. I can assure you if we were still on a 78 rpm standard, we wouldn't have access to the kind of software, the kind of music we have today.

So technologies help *create* art and communication—they often encourage people to do better things.

The challenge we face is to ensure that these opportunities are as fully exploited in the educational system as they inevitably will be in the consumer market. I'm confident there will be ways that the private and public sectors will work together to make this happen; to ensure that schools become as exciting in the next decade as homes are going to become. It *is* going to happen in the home, I promise you that. And I just hope that we, operating in the non-home sector where communications with 65,000,000 students is so important, are not left out by our own inertia, by our failure to understand the remarkable implications of what is about to happen.

Before I conclude, there is one more thing I want to mention—it concerns a new Disney project in Florida, which will have some implications for the kind of public and private cooperation we're discussing here today. It's called EPCOT. It was originally Walt Disney's idea to do this project at Walt Disney World in Florida, which is now being developed and will open to the public in October, 1982. It's going to be a major new theme park adjacent to Walt Disney World. There will be pavilions there similar to those we have in our Magic Kingdom theme park now. These pavilions will be very interesting *and* attractive—dark rides, thrill rides and films, audio-animatronic figures—all just as we now have except the subject matter will be keyed in each pavilion to the great challenges that face our nation over the next generation. Space, transportation, oceanography, land use, the environment, life and health, and so forth. Guests will be able to come to Walt Disney World, go through these exhibits, have a good time, *and* learn something about the choices and alternatives they face with respect to these major issues.

As part of EPCOT, we are beginning to develop an on-site center for educators and professional development people, a center where teachers can see how the ideas of EPCOT apply to them; how EPCOT can support them in the important job they do. Over the next several years, there will be opportunity to interface with many of you to ensure that all the opportunities for education and professional development that EPCOT holds will be fully realized.

Our opportunity at EPCOT to develop and showcase model educational systems and concepts is virtually limitless, and it will take outstanding thinking from all sectors of our society to fully realize all these potentialities and to ensure that, to the extent technology and other kinds of innovation can benefit our young people, these initiatives are given full reign to develop.

We are very excited at Disney about this "communication revolution"; there is no question in our minds that the 1980's are going to be fascinating for us, and I hope they will be for all of you, as well.

Conference Recommendations

A key aspect of the conference was to provide for the participation of all attendees not only in learning, demonstration and discussion situations, but in creating and stating the recommendations of the conference on professional development and educational technology.

The organization of the conference was designed to lead to such recommendations: the opening sessions of the conference identified issues and problems; subsequent sessions consisted of presentations of case studies where specific issues and problems had been successfully addressed; the final segment of the conference dealt with future solutions to existing problems. Interspersed with this process, individual participant groups met to analyze and prioritize issues and problems and, finally, suggest recommendations.

To facilitate full participation and to assure that all pertinent professional areas would be covered, five groups were established: a) elementary and secondary schools, b) two- and four-year colleges and universities, c) continuing education and lifelong learning, d) industry, labor and government and, e) the professions, including medical and health care, engineering and law.

THE ISSUES AND CONCERNS

On the first day of the conference, the issues and concerns were presented to the conference as follows:

Group A: Elementary and Secondary Schools

- Money—very little allocated for educational technology.
- Lack of training in use of educational technology.
- Lack of awareness of the effectiveness of educational technology by decision-makers (taxpayers, boards of education, parents, administrators).
- Lack of familiarity with what is available and how to incorporate its use.
- Teacher is not comfortable with nor prepared to use available technology.
- Research—more needed *but* in addition not necessarily to determine *best method* of teaching, but *most appropriate* method for different learning styles—means more alternatives be made available.
- Education has not made a correlation between real life and what goes on in the classroom.

- Teachers *do* need to feel they have control in the classroom.
- There is a communication/information gap between the practitioner and the developer.

Group B: Two- and Four-Year Colleges and Universities

- Lack of quality curriculum materials available and insufficient funds to adapt them locally.
- Faculty members are often poorly trained as teachers.
- Better availability of professional developers to work with faculty.
- College and university emphasis is not on good teaching.
- We, as professionals, are too conservative in our own use of technology.
- Campus service agencies may not hustle enough or may say "No" rather than making themselves an important part of the institution and generating faculty support.
- It often takes too long to get approval and/or funding from college or state administrators and task forces so faculty lose interest after initially wanting to embark on a project.
- Lack of local coordination and cooperation to share costs and to share information
- More aggressive leadership is needed to get to policy makers and once they're reached, to get them to work together to support instructional technology.
- Innovation is very hard in a time of retrenchment and declining real salaries in inflationary times.
- Faculty and institutions are reluctant to use materials they have not developed themselves (The Not-Invented-Here syndrome).

Group C: Continuing Education and Lifelong Learning

Continuing Education and Lifelong Learning group had representatives from: universities—media departments, professional associations, industry—training programs for adults, development programs for professionals and marketed through Continuing Education departments, Ed Testing Service: workshops for administrators; teaching them how to evaluate their programs

- Information sharing: users, policymakers, industry
- Equipment sharing: are there examples (a consortium) for guidance?
- *Concept* of Continuing Education and Lifelong Learning: what does it mean? Are the terms artificial and
  - A. Do they hinder getting approval and funding for programs?

B. Are continuing education and lifelong learning the same as professional development?

C. Diversity of clients—part time professionals—time and energy

D. Psychological problems involved in direct use of educational technology when no personal interaction: training necessary; is there information on this issue?; is there information on motivation of these students?;—content secondary to socializing

E. A growing and related problem: the isolated learner, including psychological barriers of growing elderly population—how to get information on this problem?

- Have to interact with other departments; breaking the barriers?
- Funding: Information and examples on how to phase out from federal seed money to private, state and local money
- Cost-effectiveness: Issue of convincing the policymakers that quality should be a major ingredient in programming.
- Copyright: Piracy a problem; how can we get guidance and support on interpretation? Enforcement? Code of ethics?
- Do we have clear statements of the evaluation of different kinds of techniques in different learning situations?
- Information: where and how to get it?—users—buyers, industry; how to plan.

Group D: Industry, Labor and Government

Group expressed overall concerns and had discussions around specific issues germane to individuals.

Overall concerns:

- Need for identification, availability and utilization of technology explored and made known nationally.
- How is education technology defined? In other words, what is it?
- Terminology: extremely valuable to trainers and educators—yet the area is never dealt with.
- Conferences, especially nationally, too often focus and operate on the basis of assumption. False. Need to address this area.

Discussion around:

- How to move students from point 1 (learning) to point 2? How fast can you take people, and at what cost?
- Cost-Effectiveness: what are the elements involved in determining?
- Are these elements considered in terms of priority?
- People need to know how technology fits into personal aspects of day-to-day job.

- People get turned off when technology is introduced. FEAR takes over. This is due primarily to the fact that the users are seldom involved in the total process.
- Need for some pre-training or introduction to technology as opposed to traditional introduction to use of technology.
- Who's training the trainer? (In other words, what's going on behind the scenes?)
- Need for closer coordination between the marketer and the user. The marketer focuses on the features of the equipment while the user concentrates on the benefits. Integration of dialogue is a *must* if we are to be successful in our effort.
- *Last,* but common in all groups: there is a need for an information data base available for all to share.

Group E: The Professions Including Medical and Health Care, Engineering, Law and Others

- Explore profit/non-profit dichotomy—check out similarities and differences.
- Explore Federal/non-Federal, Grant/non-Grant similarities and differences.
- Is Educational Technology a means to an end or an end in itself?
- The professions learner situation varies from large group situations (100 lawyers in a firm) to small group (a partnership). How can educational programs employing educational technology relate to both situations?
- How can the delivery service for education be controlled so that only those who pay for it receive it?. . . a question of marketing.
- Why, if so much educational technology is around, do professionals in the professions and industry not *trust* it or use it more in educational activities?
- People learn and expect to learn as they were taught.
- Educators, in broadest sense, not entirely convinced on use of educational technology.
- More incentive needed to use educational technology.
- Handling of what educational technology displaces important.
- What amount of educational technology is new technology?
- How can one measure the effectiveness of continuing education in the professions—both in general and specifically in relation to educational technology?
- Contact hours vs. competency exam—how to get at it?
- What incentives can be built in, both at the undergrad, grad, professional school and continuing education levels, to use educational technology?

THE SOLUTIONS

The entire conference was presented "solutions" on the last day, and subsequently refined and prioritized in terms of their relevance to the purpose of the conference as follows:

OVERALL FUTURE CONSIDERATIONS:

A. Joint conferences, such as this co-sponsorship by FICE and AECT, are of special value in bringing together people from diverse areas, strengthening the conference's value to each participant.

B. The complexity of educational technology and its continuing changes in design, development hardware, software and implementation—particularly in planning for the solution of problems in the future—require cooperative input from diverse sources.

C. Participants at conferences such as this are encouraged and should be motivated by the conference to continue their efforts in terms of recommended solutions by working with other organizations and conveying their concerns to the new Department of Education.

D. Socializing as well as professional discussions among people representing different areas of concern, as at this conference, is of special value in encouraging cooperative action toward common goals.

ELEMENTARY AND SECONDARY SCHOOLS:

A. Effective use of communications media is dependent upon two-way communications, not only in the process itself, but in additional feedback from users.

1. In this process, feedback from teachers is essential.

B. There should be constant communications among all professional organizations and associations using (or whose membership is involved in the use of) educational technology.

C. Conventions—specifically the annual convention of the co-sponsor, AECT—should include participatory sessions for teachers, PTA representatives and other decision-makers who need to be informed about the potentials and utilization of technology.

TWO- AND FOUR- YEAR COLLEGES AND UNIVERSITIES:

A. The recommendations of the February, 1978 conference on " Teacher Training and Educational Technology" sponsored by FICE's

Subcommittee on Educational Technology should be given priority attention for implementation.

B. Conferences such as this should be held in various central locations in the country and should make use of telecommunication techniques in its presentations.

C. FICE and AECT should assume leadership roles in communicating to policy makers the need for adequate funding for the application of educational technology.

1. FICE, as a major component of the new Department of Education, should convene a conference of policy makers and gate-keepers (such as chancellors, college presidents, commissioners, legislators, and Board of Education) for the purpose of presenting to them the increasingly vital role and benefits of educational technology, and the need for their support in promoting its use and funding.
2. FICE should hold a series of seminars on educational technology application via satellite, linking some 10–20 points throughout the country, and involving administrators, teachers, board members, parents, students, and professional organizations.
3. FICE and AECT should seek to participate in the convention programs of professional organizations of educational administrators (such as CCSSO, AASA, AACTE, ASCD) to familiarize these education decision-makers with the value of and need for encouragement of educational technology.

D. A series of workshops and conferences should be held where those who have successfully applied educational technology can share their experiences through presentation and analysis of comprehensive care histories.

E. A series of workshops and conferences should be held to train educational technologists to be effective change agents.

F. The various professional organizations interested in the application of educational technology (such as AECT, ALA, AASL, ASTD) should jointly sponsor regional conferences for their members and others.

G. FICE should approach the regional accreditation agencies to encourage them to put increased importance on the application of educational technology throughout higher education programs.

H. Colleges of education should provide more organized training in educational technology for all of their students in as much as these individuals will be the policy makers of the future.

I. Training should be provided for educational product sales people (such as NAVA members) so they can accurately describe the appropriate uses and advantages of various applications of educational technology.

J. An information sharing network should be established to provide:
   1. Names of speakers and resource people;
   2. Information on successful applications of educational technology, including the names of the project directors;
   3. Software reports.

K. Materials demonstrating applications of educational technology should be made more widely available.

L. Federal agencies should place more emphasis on disseminating the results of funded educational technology projects.

CONTINUING EDUCATION AND LIFELONG LEARNING:

A. Clearinghouses for information on educational technology should be established in all geographical areas and for all professional need areas.

B. Satellite spectrum space should be reserved for educational purposes, particularly in serving the needs of isolated persons who rely on continuing and lifelong educational services.

C. FICE and AECT (or other appropriate organizations/agencies) should sponsor an annual Professional Development and Educational Technology conference of this kind.
   1. These conferences and similar ones should be made available to groups and individuals all over the country through interactive satellite use.

D. The recommendations of the 1978 FICE Subcommittee on Educational Technology conference on Teacher Training and Educational Technology should be implemented.

INDUSTRY, LABOR AND GOVERMENT:

A. A network (such as clearinghouse) should be established to permit interaction among labor-industry-government and educational institutions, to maximize the dissemination of information necessary to provide for effective motivation and use of technology.

B. Further conferences of this nature should be held, emphasizing business as well as educational applications, and utilizing technology (such as live satellite hookups) in its presentations.

C. A series of workshops updating the work of this conference should be held in the near future in various parts of the country, and should include:
   1. Current information on educational technology resources and uses;
   2. A list of feasibility studies completed and underway;

3. Cost comparisons and benefits.

D. A number of appropriate professional organizations and associations should make special efforts to serve the needs of information gathering and exchange, including such groups as ASTD, ASE, AES, AASA.

E. The Department of Education should reexamine the concept of lifelong learning in relation to the use of technology, and should encourage cooperation between education and industry in the development of appropriate technology.

1. Curriculum needs and application purposes should be clearly defined before federal funding of facilities and equipment;
2. Resources should be provided through higher education to permit dissemination of programmatic information on effective technology utilization.

F. Participants in such conferences must assume individual and corporate responsibility for the eradication of functional illiteracy and, in so doing, must move from a cost-effective to a quality-effective posture.

THE PROFESSIONS:

A. Technology has been applied in many professional situations, including dramatic health and medical applications with the ATS-6 satellite experiment. Further uses along these lines should continue with proper support.

B. Further conferences of this nature should be held, with an emphasis on use of technology within the conference, hands-on participation with various kinds of software, and an analysis of the cost-effectiveness of each technological mode.

C. A Glossary of Terms needs to be developed to provide a common ground for all edcational technology users because of the proliferation and continuing changes of communications techniques and modes.

D. A clearinghouse serving as a hub for an information network should be established.